

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF PUBLIC WORKS

Standard Drawings
for
Traffic Signals
and
Highway Lighting



Traffic Engineering

Boston, Massachusetts

1968

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Commissioner

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INDEX

| | Page |
|--|------|
| Symbols Used on Signal Layouts - - - - - | 3 |
| Symbols Used on Lighting Layouts - - - - - | 4 |
| Traffic Signal Cable - Color Code - - - - - | 5 |
| Design Loading - Highway Lighting Poles - - - - - | 6 |
| <u>Conduit</u> | |
| Fibre duct in trench - - - - - | 7 |
| Fibre duct - concrete encased - - - - - | 8 |
| Duct crossing roadway - - - - - | 9 |
| Duct end location - - - - - | 10 |
| <u>Electric Manholes</u> | |
| 3' Diameter X 3'6" - (SD2.010) - - - - - | 11 |
| 3'6" X 4'6" X 5'0" - (SD2.011) - - - - - | 12 |
| 4'0" X 4'0" X 6'0" - (SD2.012) - - - - - | 13 |
| 5'0" X 7'0" X 7'0" - (SD2.013) - - - - - | 14 |
| 6'0" X 9'0" X 10'0" - (SD2.014) - - - - - | 15 |
| 4'0" X 4'0" X 6'6" - - - - - | 16 |
| <u>Electric Handholes</u> | |
| 18" Diameter - Fibre - (SD2.020) - - - - - | 17 |
| 24" Diameter - Fibre - (SD2.021) - - - - - | 17 |
| 24" X 13" X 36" - Concrete - (SD2.022) - - - - - | 18 |
| 24" X 24" X 36" - Concrete - (SD2.023) - - - - - | 19 |
| 24" X 24" X 36" - Concrete - (SD2.024) - - - - - | 20 |
| 36" X 36" X 36" - Concrete - - - - - | 21 |
| <u>Pull Boxes</u> | |
| 8" X 23" - - - (SD2.030) - - - - - | 22 |
| 12" X 12" - - - (SD2.031) - - - - - | 23 |
| Pull Box Frame & Cover - - - - - | 24 |
| <u>Light Standard Foundations</u> | |
| Anchor Base Foundation - - - - - (SD3.010) - - - - - | 25 |
| Anchor Base Foundation - - - - - (SD3.011) - - - - - | 26 |
| Transformer Base Foundation - - - - (SD3.012) - - - - - | 27 |
| Foundation for 30'-40' Mounting Height - (SD3.013) - - - - - | 28 |
| Foundation for 40'-100' Mounting Height - (SD3.014) - - - - - | 28 |
| Foundation on Structures - - - - - | 29 |
| Lighting Load Center Foundation - - - - (SD3.020) - - - - - | 30 |
| <u>Traffic Signal Post Foundations</u> | |
| Standard Signal Post Foundation - - - (SD3.030) - - - - - | 31 |
| Pedestal Type Foundation - - - - - (SD3.031) - - - - - | 32 |
| Mast Arm Foundation - - - - - (SD3.040) - - - - - | 33 |
| Traffic Signal Control Box Foundation - - - (SD3.050) - - - - - | 34 |
| Traffic Signal Control Box Locks & Keys - - - - - | 35 |
| Traffic Signal Service Connection - Overhead - - - - - | 36 |
| <u>Painting</u> | |
| Standard marking on signal post to indicate pedestrian push button location - - - - - | 37 |
| <u>Traffic Signal Posts and Bases</u> | |
| Standard Post and Base - - - - - | 38 |
| Standard Post with Signal and Pedestrian Housings - - - - - | 39 |
| Signal Post - Pedestal Type - - - - - | 40 |

INDEX

| | Page |
|--|--------|
| Column Base - Pedestal Type - - - - - | 41 |
| Pedestal Base - - - - - | 42, 43 |
| Mast Arm - - - - - | 44 |
| Monolever Signal Pole - - - - - | 45 |
| <u>Signal Assemblies and Mounting Assemblies</u> | |
| 8" Traffic Signal Assembly - - - - - | 46 |
| Standard Arrow for 8" Signal Lens - - - - - | 47 |
| Standard Arrow for 12" Signal Lens - - - - - | 48 |
| Post Top Mounted 8" Traffic Signals - - - - - | 49 |
| Mounting 8" Traffic Signals - - - - - | 50 |
| Pole Clamps for Steel Pole Mounting - - - - - | 51 |
| Mast Arm Hanger - Type 2 - - - - - | 52 |
| Mast Arm Hanger - Type 1 - - - - - | 53 |
| Side Mounted Slip Fitter for Mast Arm Mounting - - - - - | 54 |
| Louvers for 8" Signals - - - - - | 55 |
| Backplates for 8" Signals - - - - - | 56 |
| Meter Box Casting for 4" Pipe Post - - - - - | 57 |
| Meter Box Casting - Flat Front Pipe Entrance - - - - - | 58 |
| Wire Loop Detector Installation - - - - - | 59 |
| Pedestrian Actuated Signal Signs - - - - - | 60 |
| Wiring Diagram for Mercury Luminaire - - - - - | 61 |
| Utility Service Pole Riser - Highway Lighting - - - - - | 62 |
| Flashing Beacons - - - - - | 63 |
| Illuminated Turn & Curve Signs - - - - - | 64 |

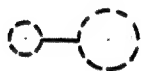
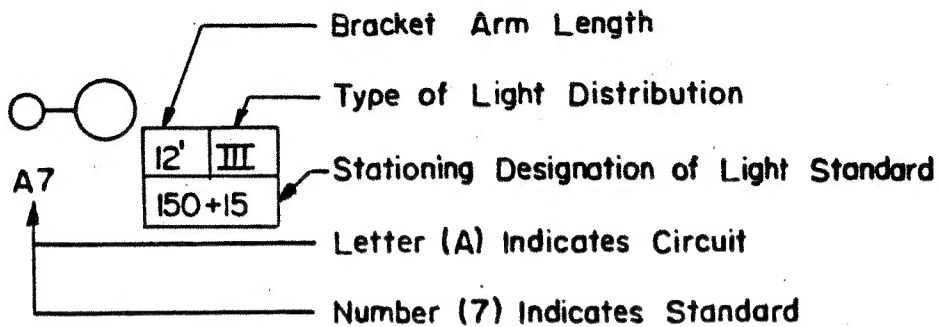
SYMBOLS USED ON SIGNAL LAYOUTS

| | |
|-----------------|--|
| ○ | Signal Post |
| □ | 12" X 12" Pull Box |
| ◻ | 8" X 23" Pull Box |
| ⊠ | Control Cabinet |
| ⊠ | Flashing Beacon Control & Meter Pedestal |
| ⊙ | Wooden Pole |
| ⊙ | Mast on Wooden Pole |
| —○— | Steel or Aluminum Mast Arm |
| —m— | Magnetic Detector |
| LANE —m— | Magnetic Lane Detector |
| —p— | Pressure Detector |
| DIR —m— | Directional Magnetic Detector |
| —○ ^R | Radar Detector |
| —○ ^S | Sonic Detector |
| —□— | Inductive Loop Detector |
| ⊕ | Pedestrian Push Button |
| → | Signal or Flasher Housing |
| === | Proposed Conduit |
| --- | Existing Conduit |
| -.-.- | Overhead Cable |
| —□ | Pedestrian Walk-Dont Walk Signal |
| | Direct Burial Cable |

SYMBOLS USED ON LIGHTING LAYOUTS



High Mast Pole or Tower



Existing or Future Assembly By Others



Flood Type Luminaire



Fluorescent Luminaire



Electric Handhole



Electric Manhole



Ground



Load Center Assembly



12" X 12" Pull Box



8" X 23" Pull Box



Control Cabinet



Wooden Pole



Proposed Conduit (Size, Type, No. Cables)



Existing Conduit



Overhead Cable



Direct Burial Cable (Size)

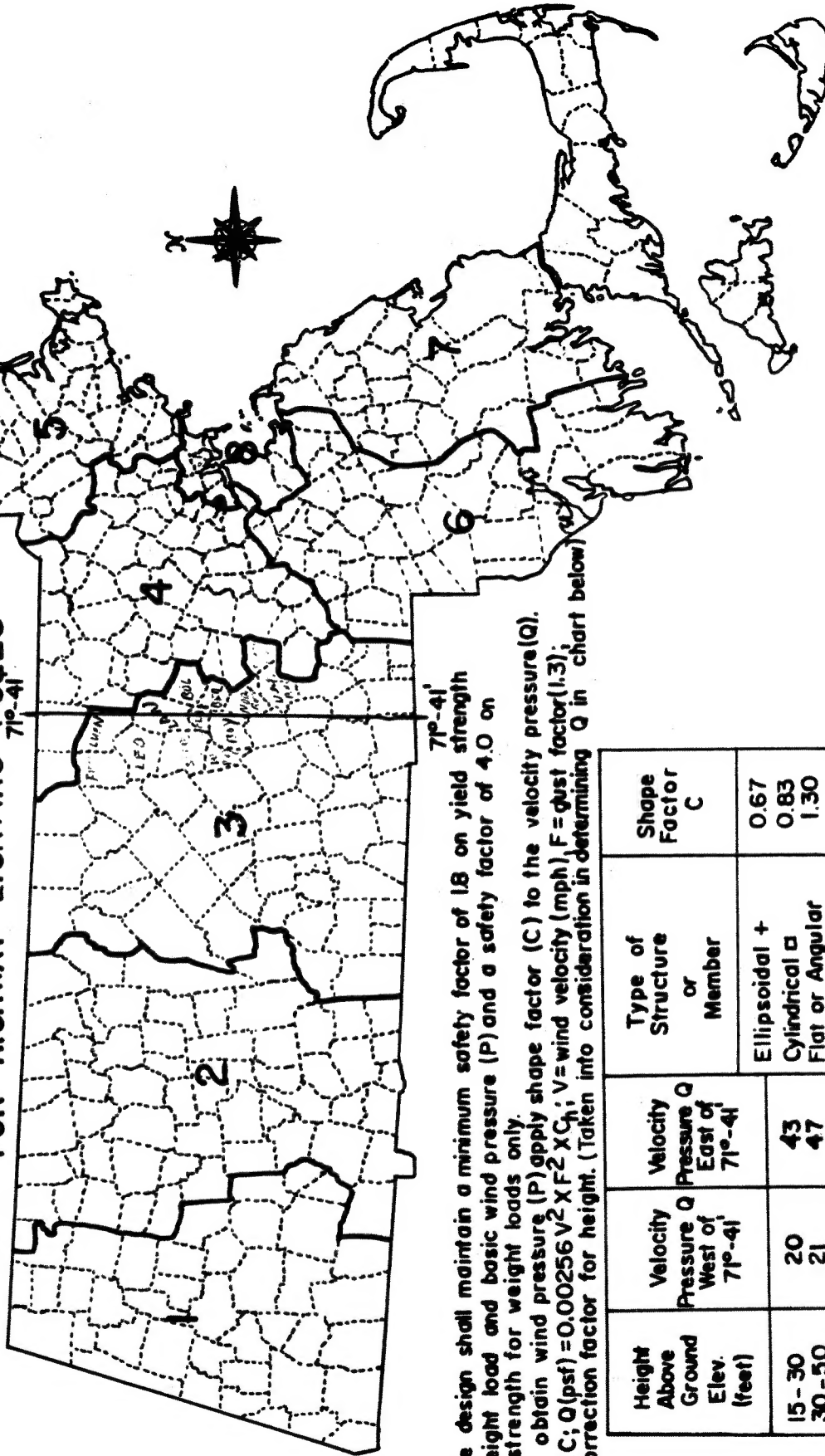
TRAFFIC SIGNAL WIRING COLOR IDENTIFICATION CODE

| | | |
|-----|----------------|---|
| 1. | Black | Power-Pedestrian Push Button, Arrows, Spare |
| 2. | White | Common |
| 3. | Red | Phase - Main St. |
| 4. | Green | Phase - Main St. |
| 5. | Orange | Phase - Main St. |
| 6. | Blue | Pedestrian Walk, Arrows, Spare |
| 7. | White - Black | Pedestrian Dont-Walk, Arrows, Spare |
| 8. | Red - Black | Phase - Side St. |
| 9. | Green - Black | Phase - Side St. |
| 10. | Orange - Black | Phase - Side St. |
| 11. | Blue - Black | Pedestrian Walk, Arrows, Spare |
| 12. | Black - White | Pedestrian Dont-Walk, Arrows, Spare |
| 13. | Red - White | Phase - Side St. |
| 14. | Green - White | Phase - Side St. |
| 15. | Blue - White | Phase - Side St. |
| 16. | Black - Red | Miscellaneous and Spare |
| 17. | White - Red | Miscellaneous and Spare |
| 18. | Orange - Red | Miscellaneous and Spare |
| 19. | Blue - Red | Miscellaneous and Spare |
| 20. | Red - Green | Miscellaneous and Spare |
| 21. | Orange - Green | Miscellaneous and Spare |

Either Type I or Type 2 Traffic Signal Cable as specified in Section 804 may be installed when the air temperature is above 32° F. Type 2 Traffic Signal Cable shall be installed when the air temperature falls between 32° F and 20° F. No Cable is to be installed when the air temperature is below 20° F.

When Pedestrian Signal Heads have been incorporated in the installation at least 2 spare conductors shall be provided in all Signal Cable Runs. All other installations shall have at least 5 spare conductors provided in all Signal Cable Runs.

DESIGN WIND & WEIGHT LOADING FOR HIGHWAY LIGHTING POLES 7°-41'



The design shall maintain a minimum safety factor of 1.8 on yield strength for weight load and basic wind pressure (P) and a safety factor of 4.0 on yield strength for weight loads only.

To obtain wind pressure (P) apply shape factor (C) to the velocity pressure (Q).
 $P = Q \times C$; $Q (\text{psf}) = 0.00256 V^2 \times F \times C_H$; $V = \text{wind velocity (mph)}$; $F = \text{gust factor (1.3)}$;
 $C_H = \text{correction factor for height. (Taken into consideration in determining Q in chart below)}$

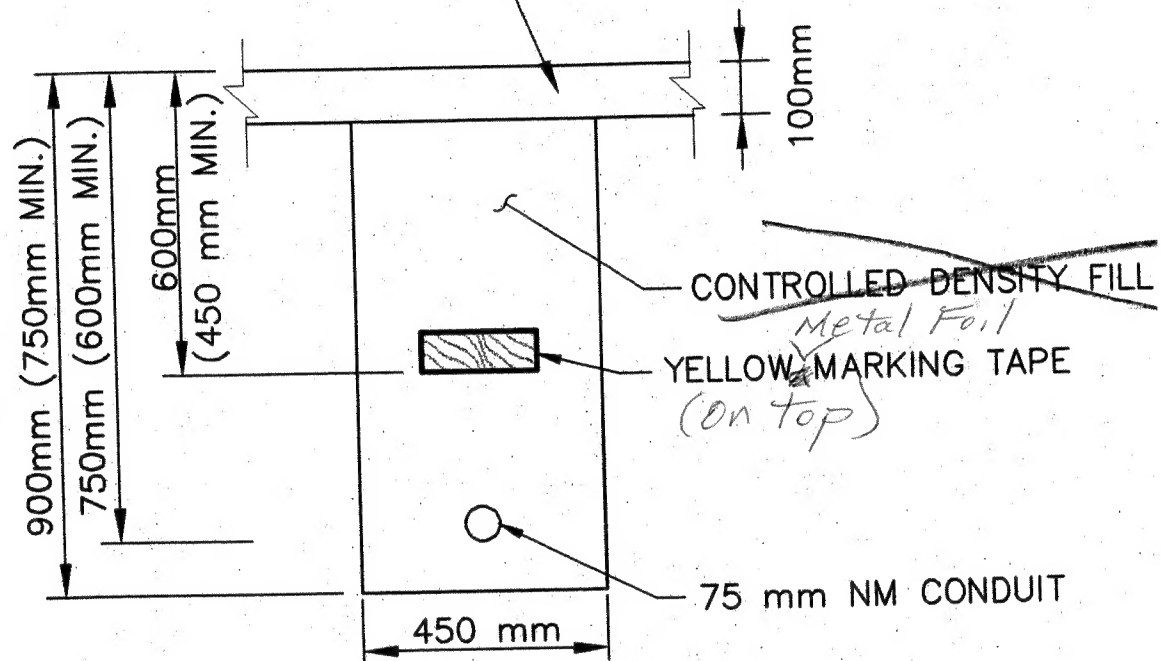
| Height Above Ground Elev. (feet) | Velocity Pressure Q West of 7°-41' | Velocity Pressure Q East of 7°-41' | Type of Structure or Member | Shape Factor C |
|----------------------------------|------------------------------------|------------------------------------|---------------------------------|----------------|
| 15-30 | 20 | 43 | Ellipsoidal + | 0.67 |
| 30-50 | 21 | 47 | Cylindrical □ | 0.83 |
| 50-100 | 24 | 53 | Flat or Angular | 1.30 |
| 100-300 | 29 | 64 | Max. Luminaire Weight 75 # | |
| 300-500 | 32 | 71 | Max. Lum. Projected Area 3.3 □ | |
| V = | 67 mph | 100 mph | Max. Lum. Support Length 15 ft. | |

NOTE: + Standard metallic vapor luminaire shape.
 □ Poles and bracket arm shapes.

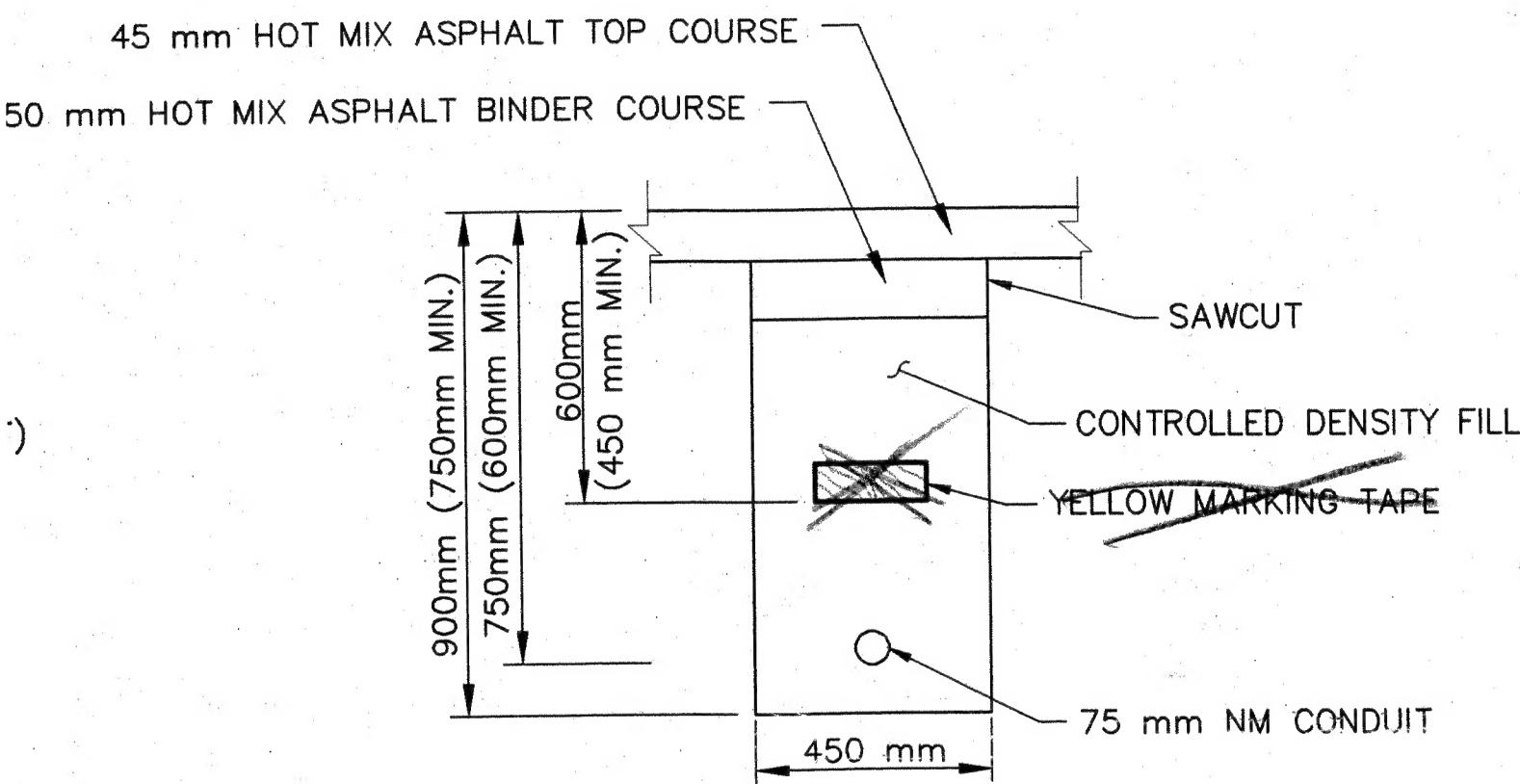
Commonwealth of Massachusetts
Department of Public Works

R. J. McNeil
Traffic Engineer
R. J. McNeil
Bridge Engineer
R. J. McNeil
Chief Engineer

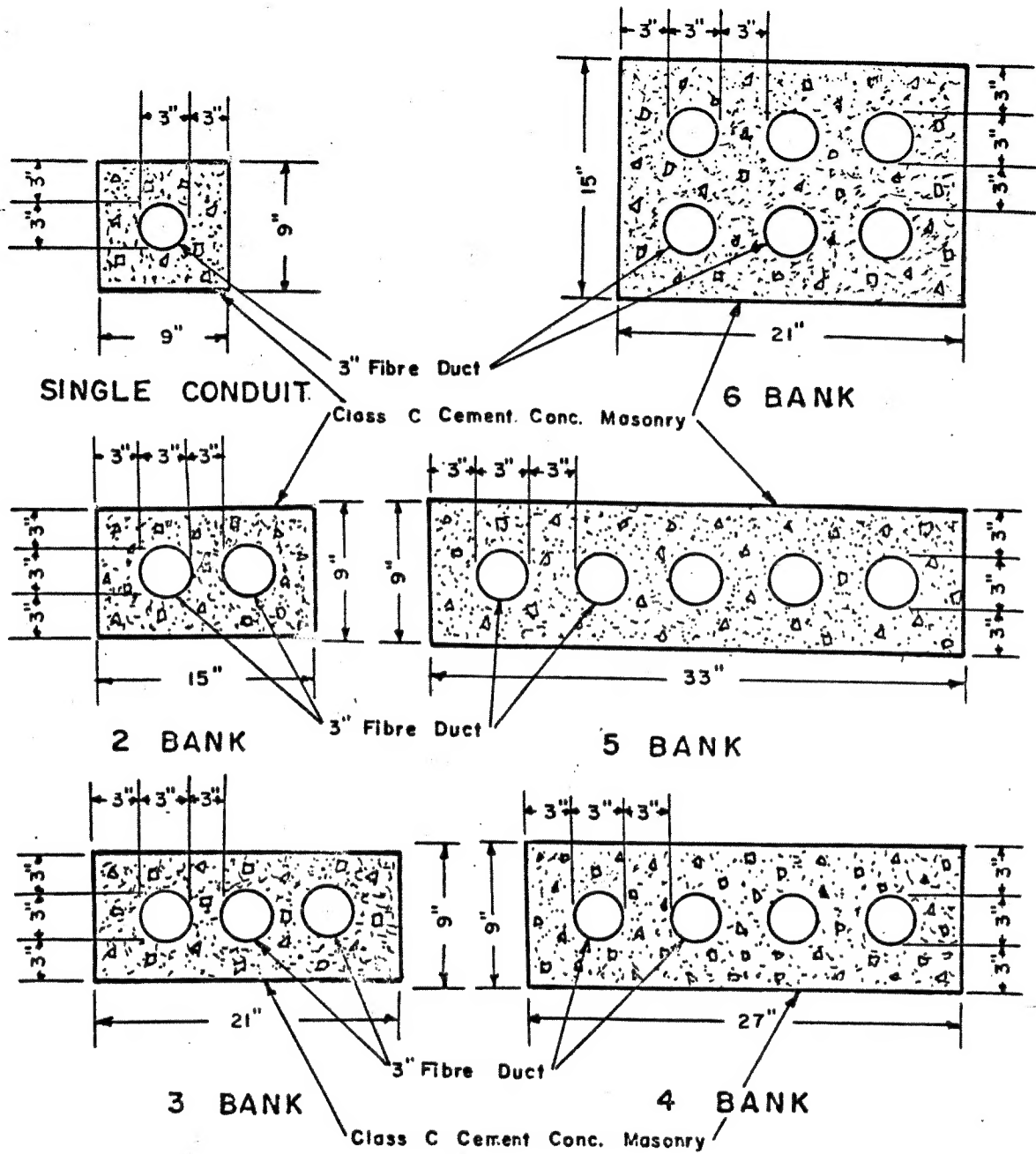
100 mm CEM. CONC. SIDEWALK



CONDUIT DETAIL FOR SIDEWALK CROSSING
NOT TO SCALE



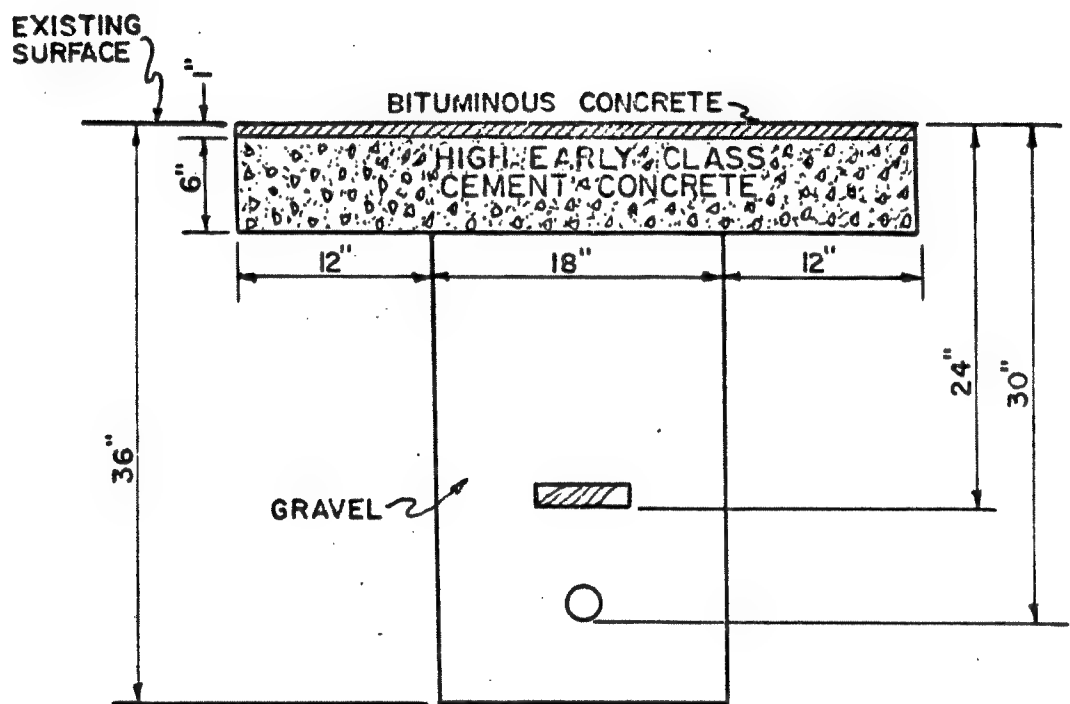
CONDUIT DETAIL FOR ROADWAY CROSSING
NOT TO SCALE



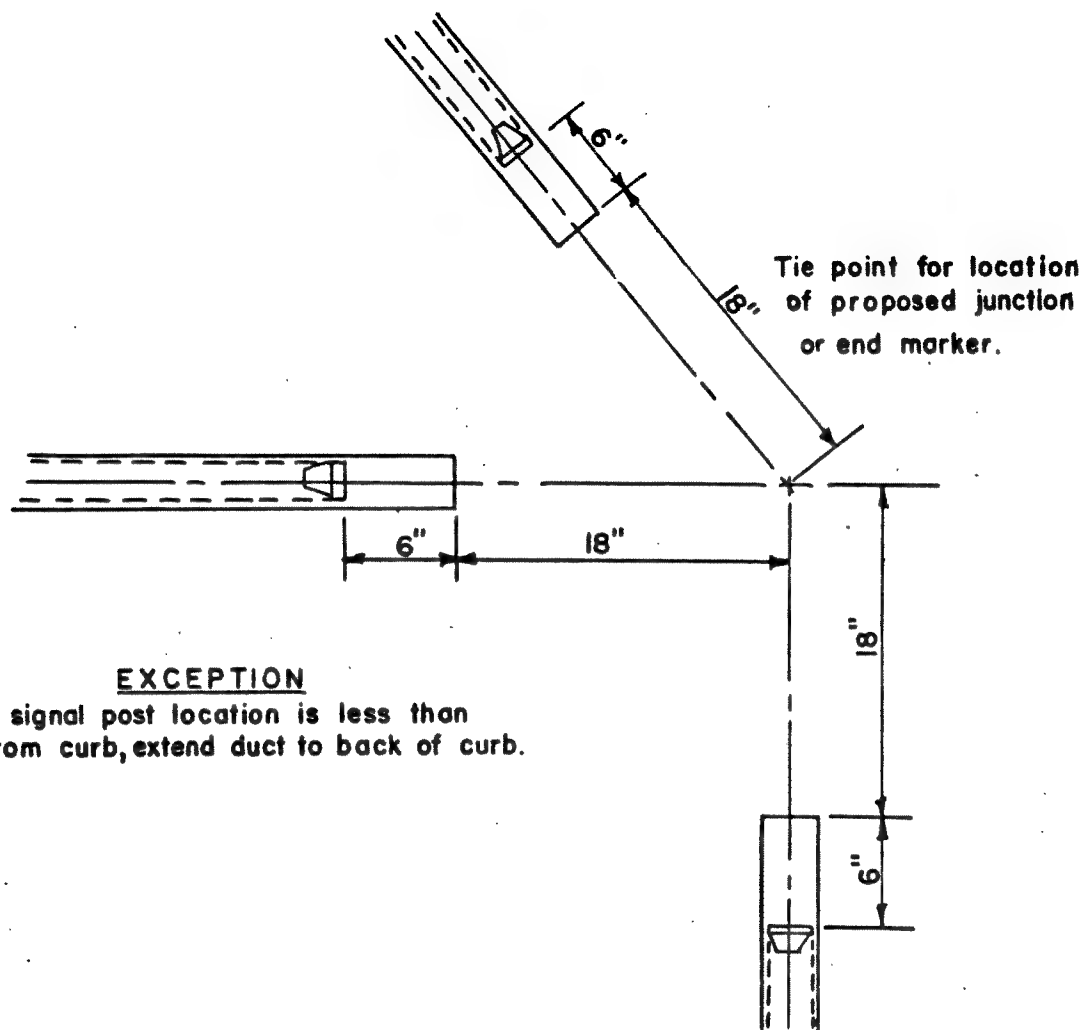
All 3" Fibre Ducts in Concrete Envelopes to be 30 Inches
Under All Paved Surfaces

TYPICAL CONDUIT ENCASEMENT UNDER PAVEMENT

DUCT CROSSING ROADWAY

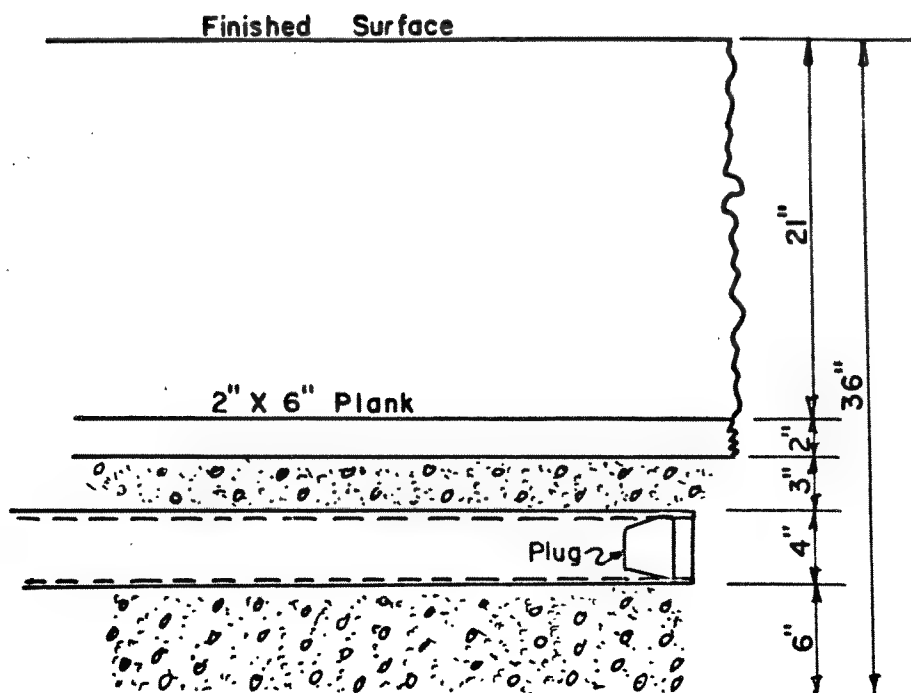


LOCATION OF TRAFFIC SIGNAL DUCT END



EXCEPTION

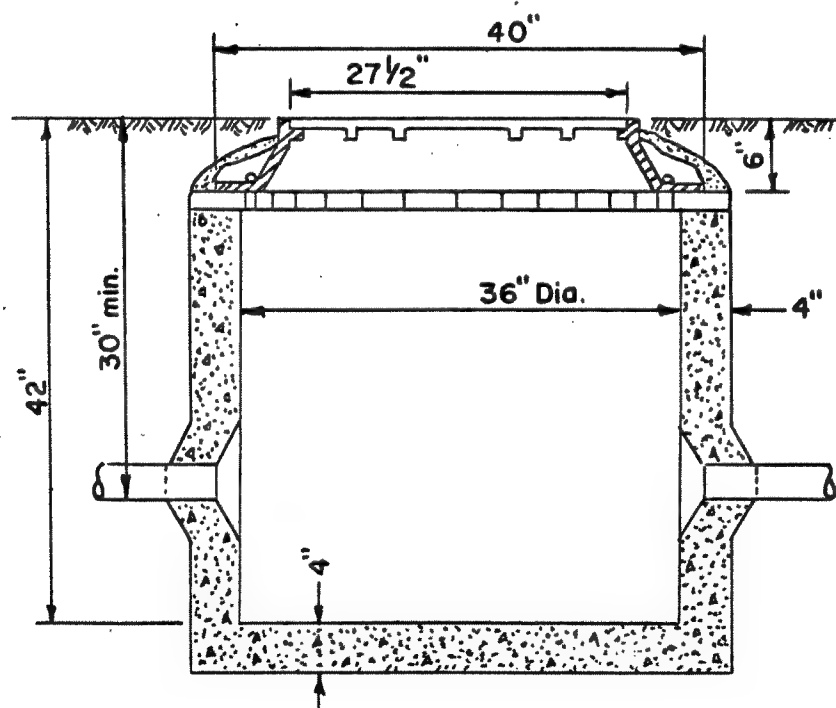
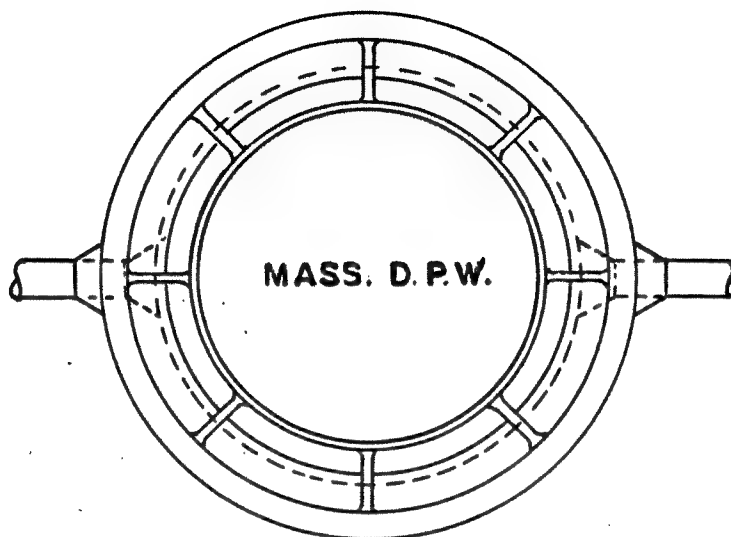
When signal post location is less than 30" from curb, extend duct to back of curb.



Scale: $\frac{3}{32} = 1"$

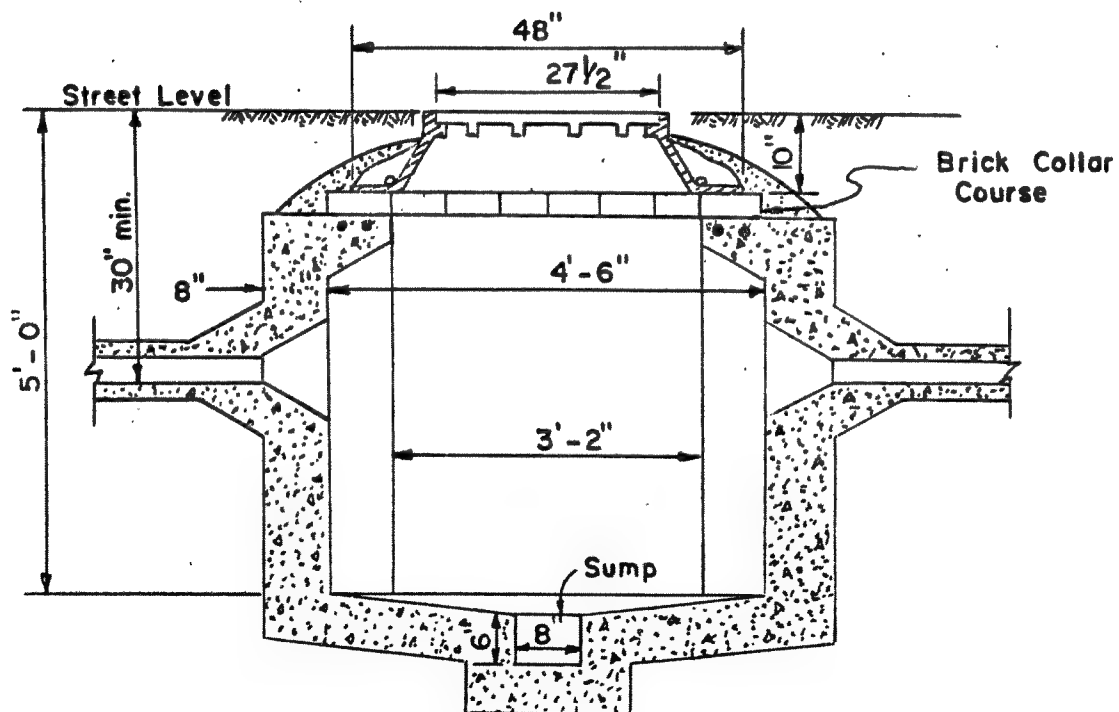
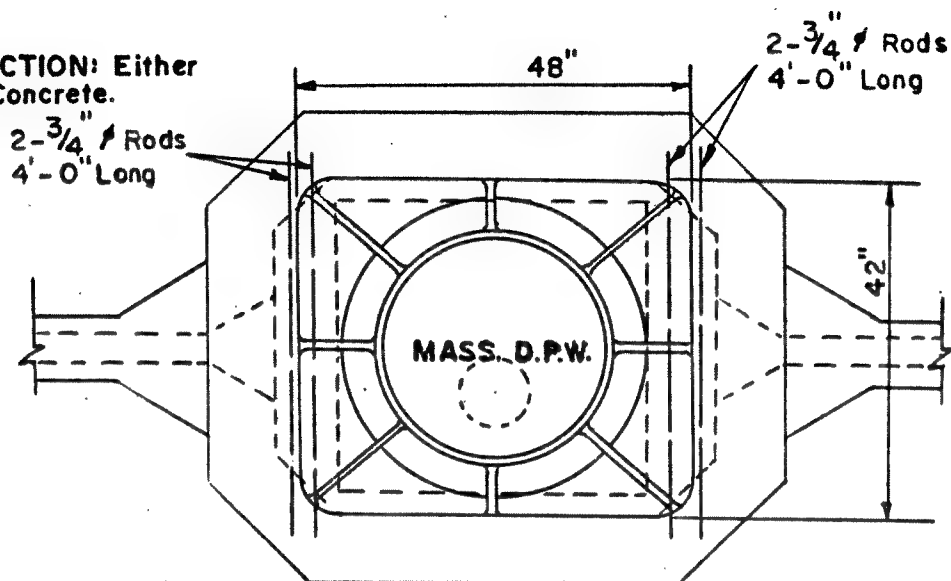
3' Dia. X 3'-6" ELECTRIC MANHOLE

CONSTRUCTION: Either
Brick or Concrete.

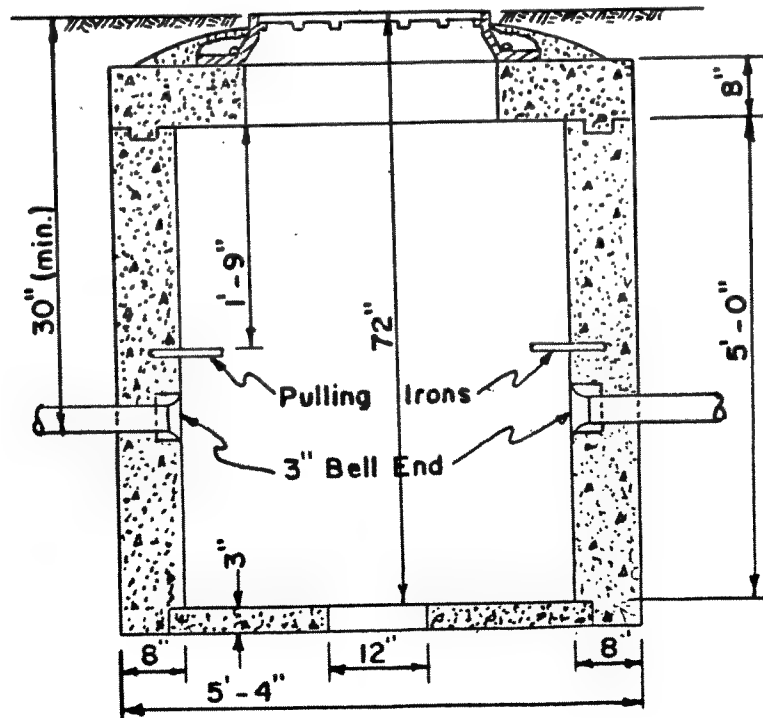
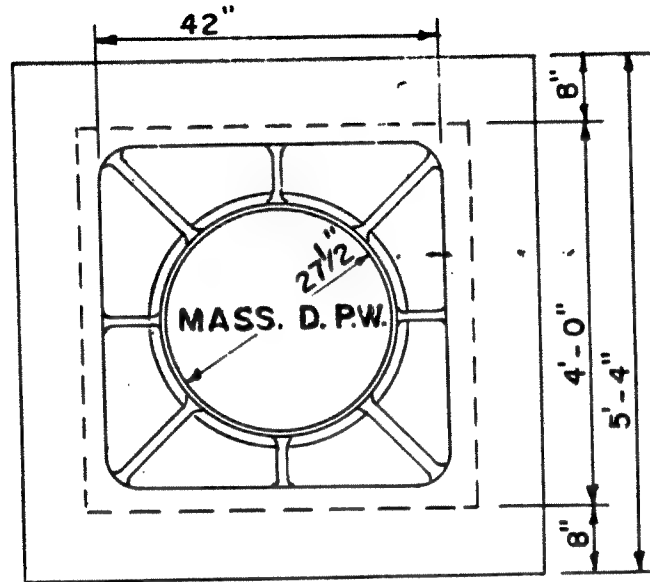


3'-6" X 4'-6" X 5'-0" ELECTRIC MANHOLE

CONSTRUCTION: Either
Brick or Concrete.



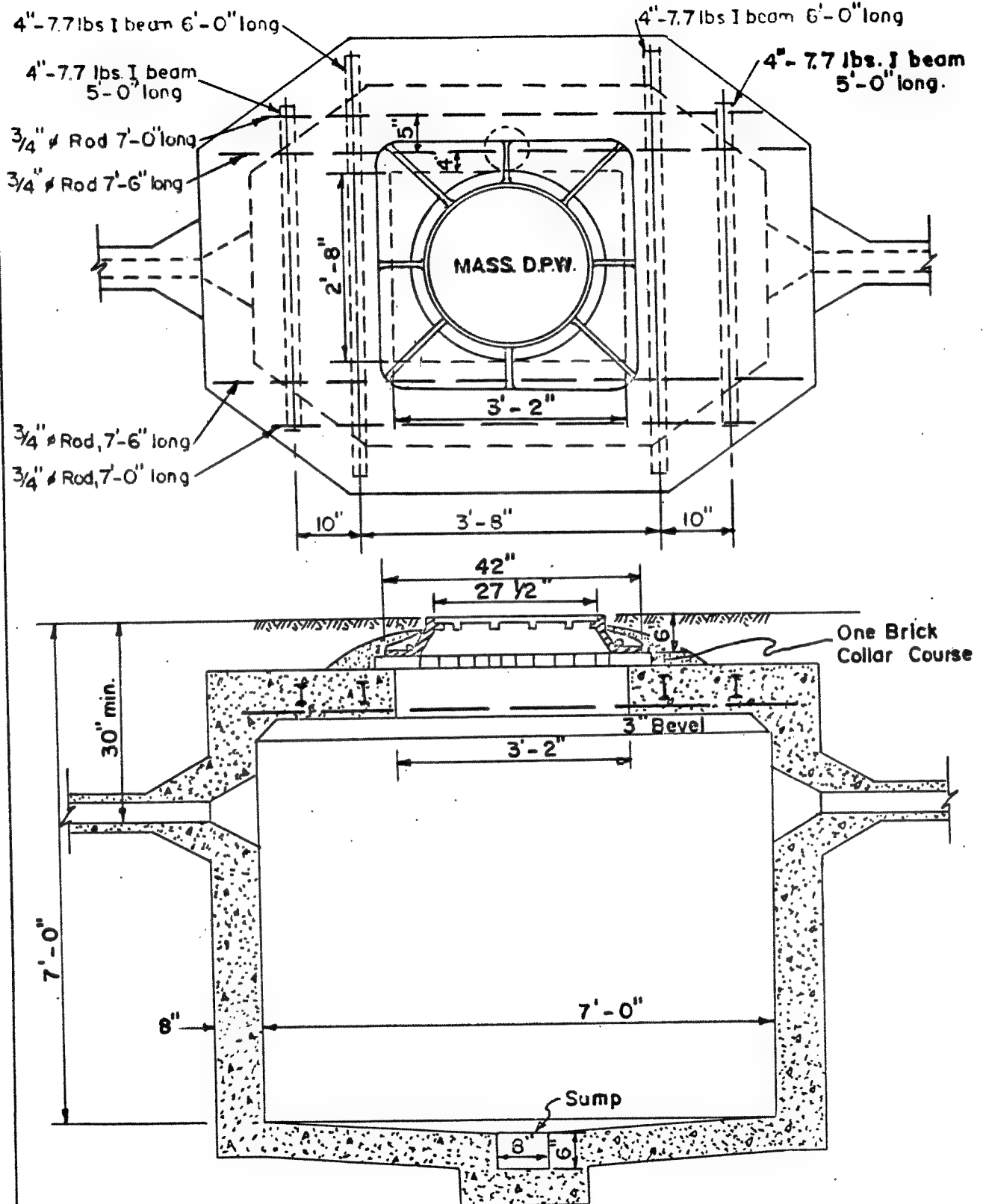
4' X 4' X 6' ELECTRIC MANHOLE



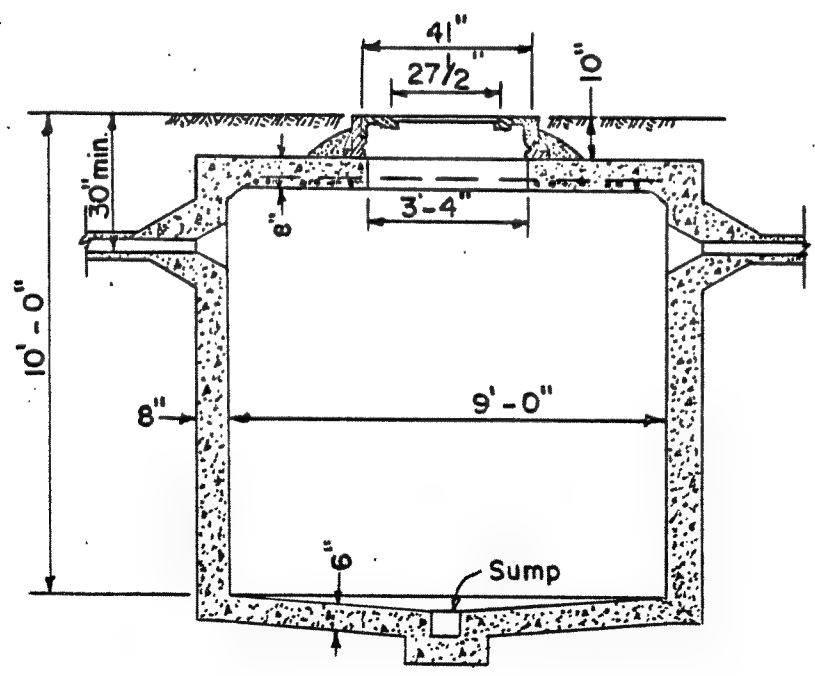
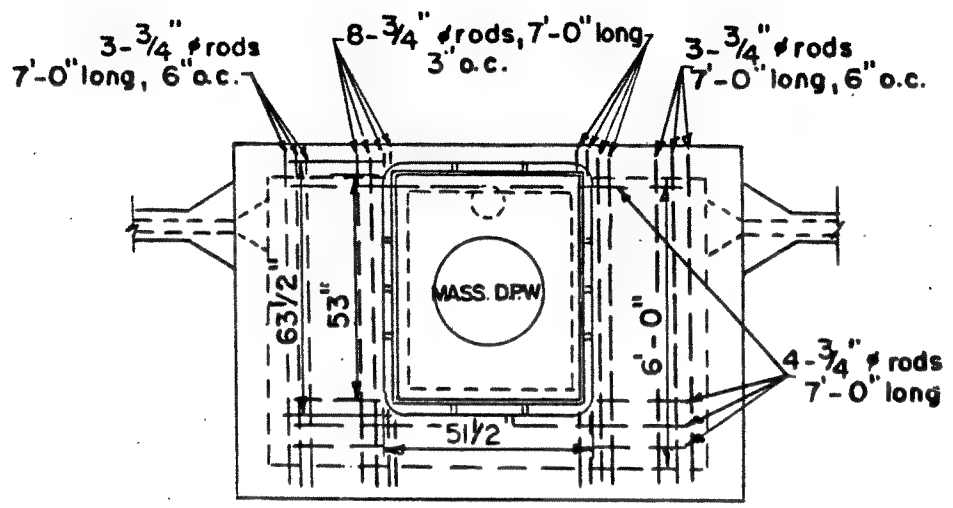
5' X 7' X 7'

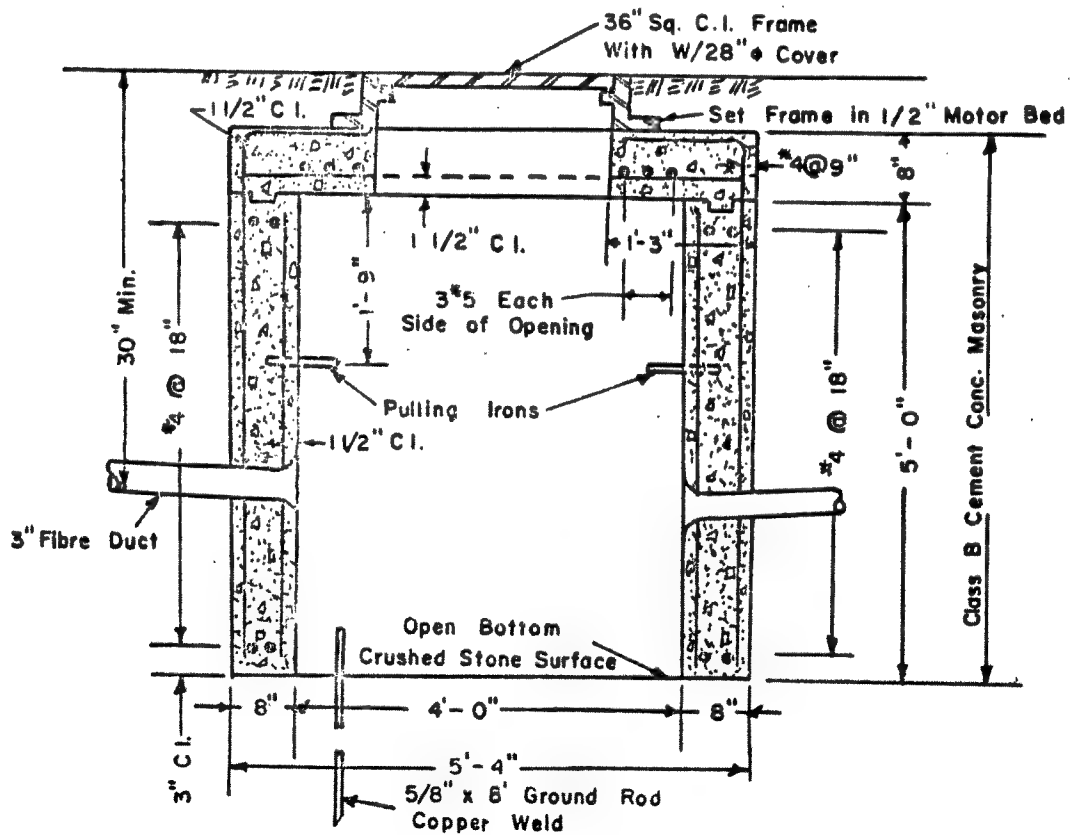
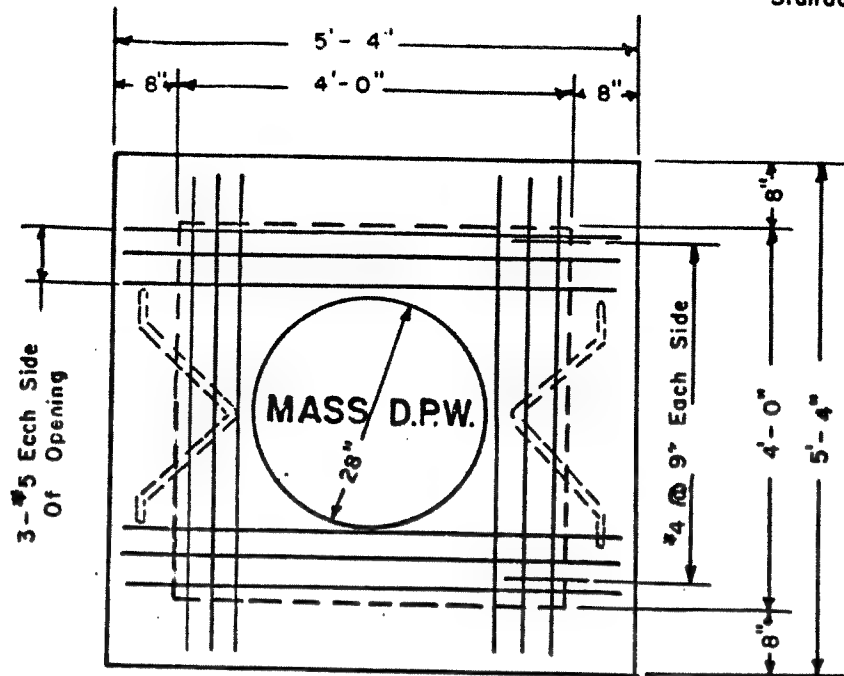
ELECTRIC

MANHOLE



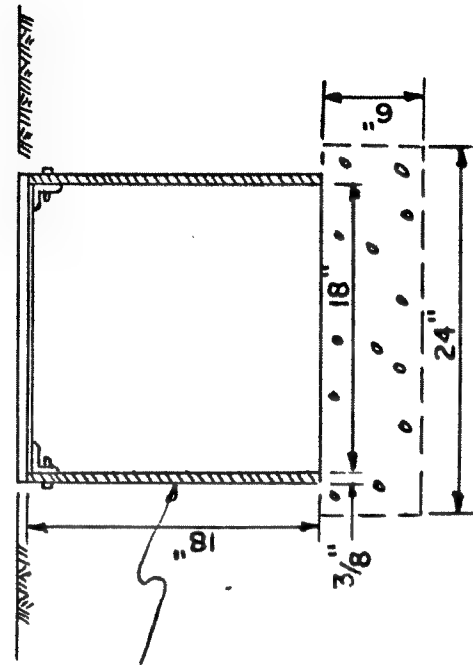
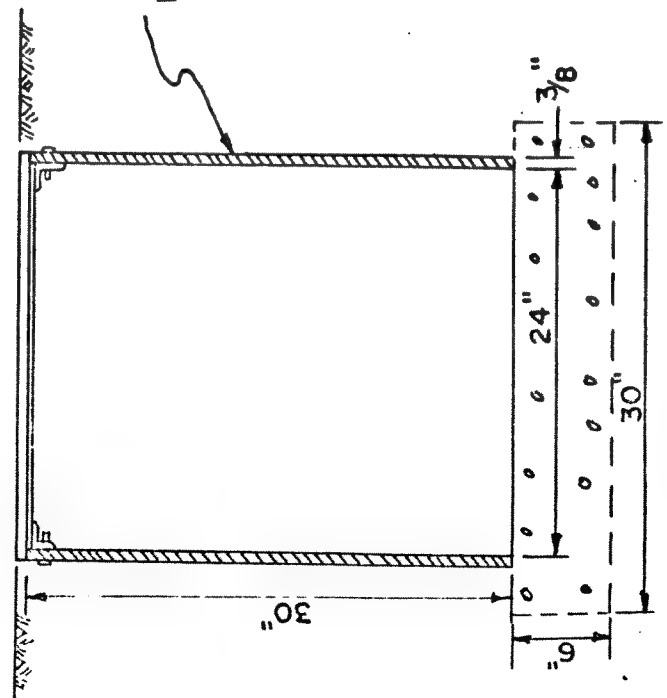
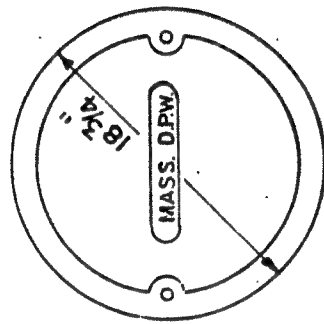
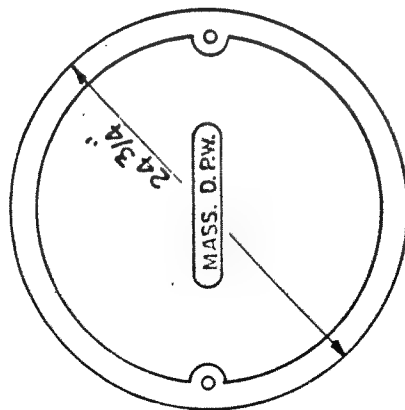
6' X 9' X 10' ELECTRIC MANHOLE



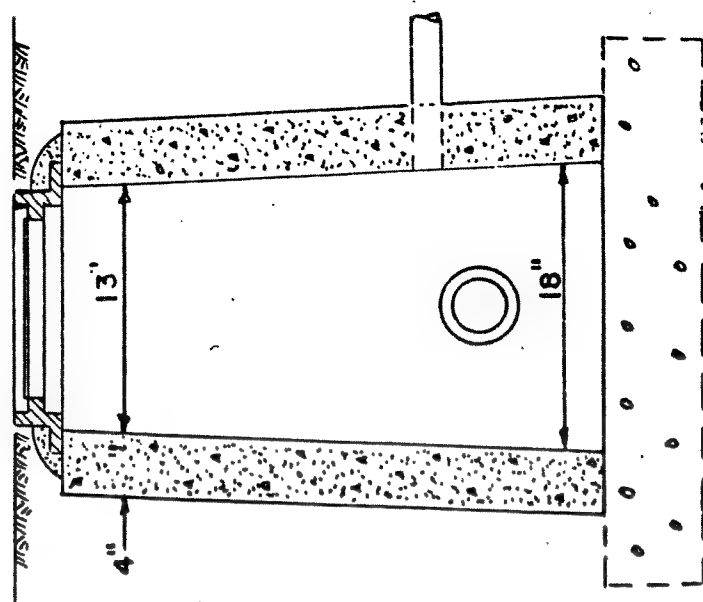
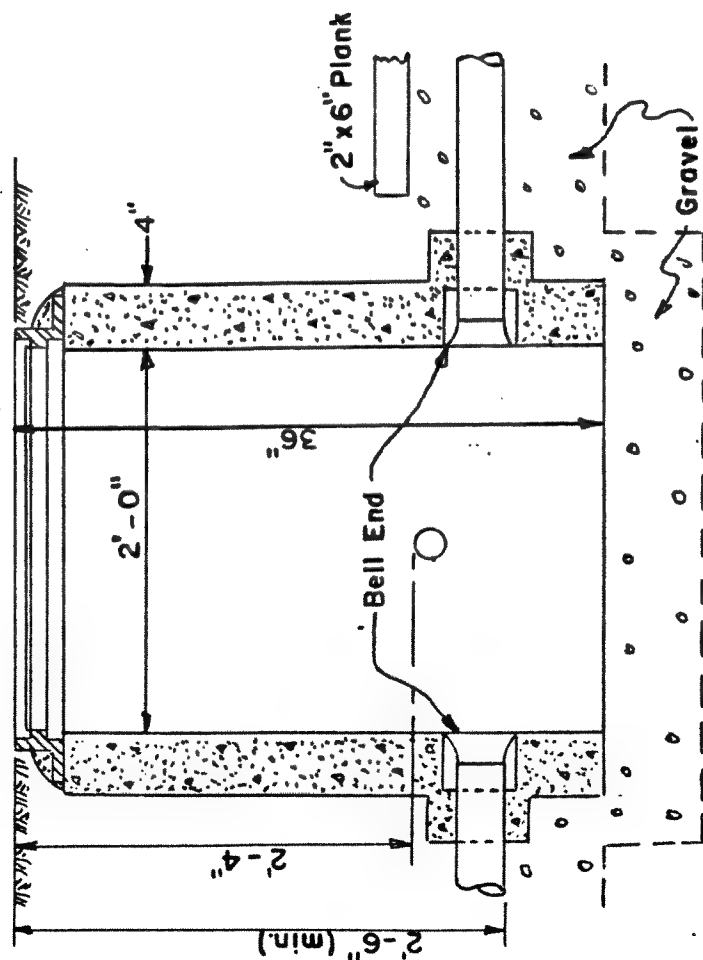
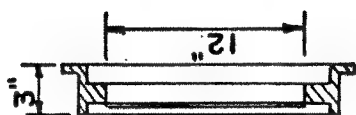
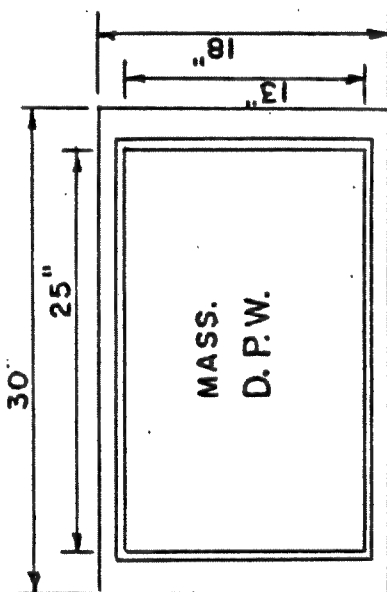


ELECTRIC MANHOLE

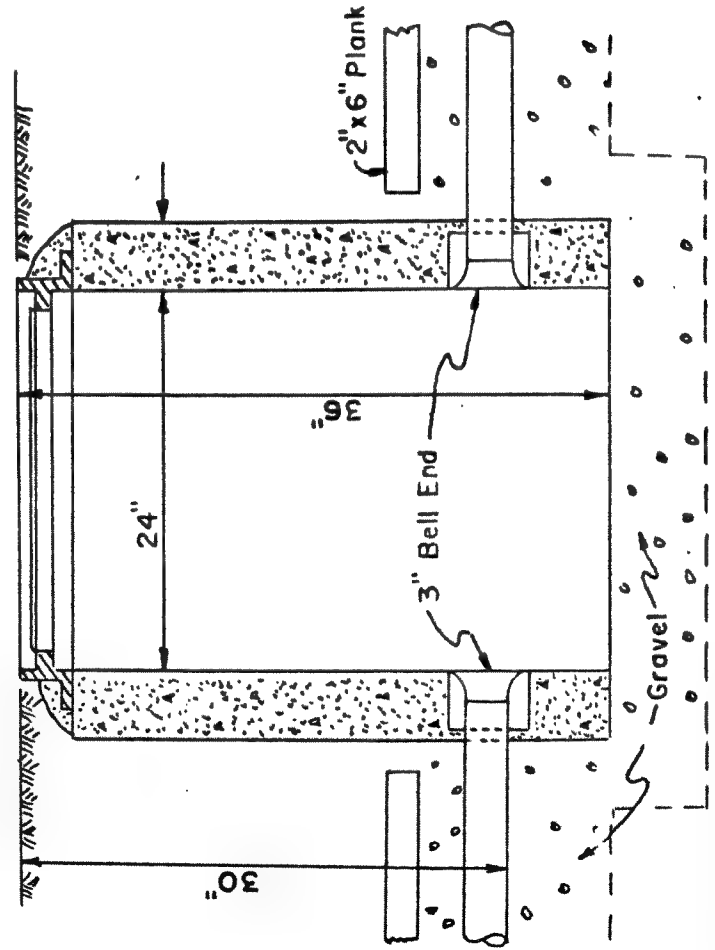
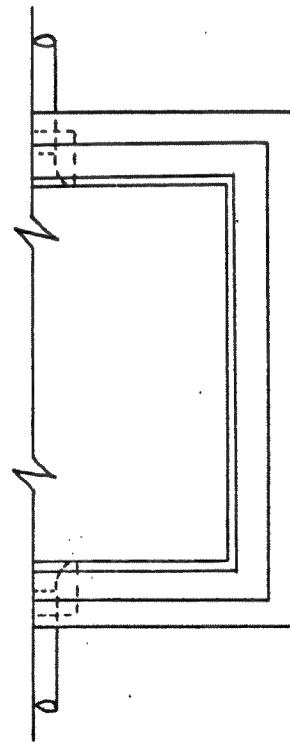
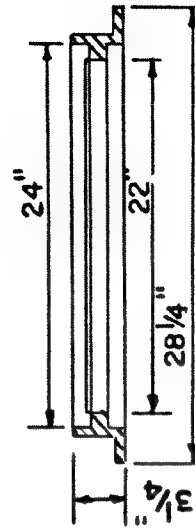
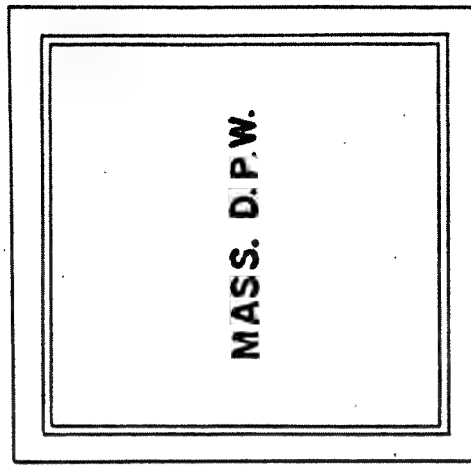
18 in. Dia. & 24 in. Dia. ELECTRIC HANDHOLE



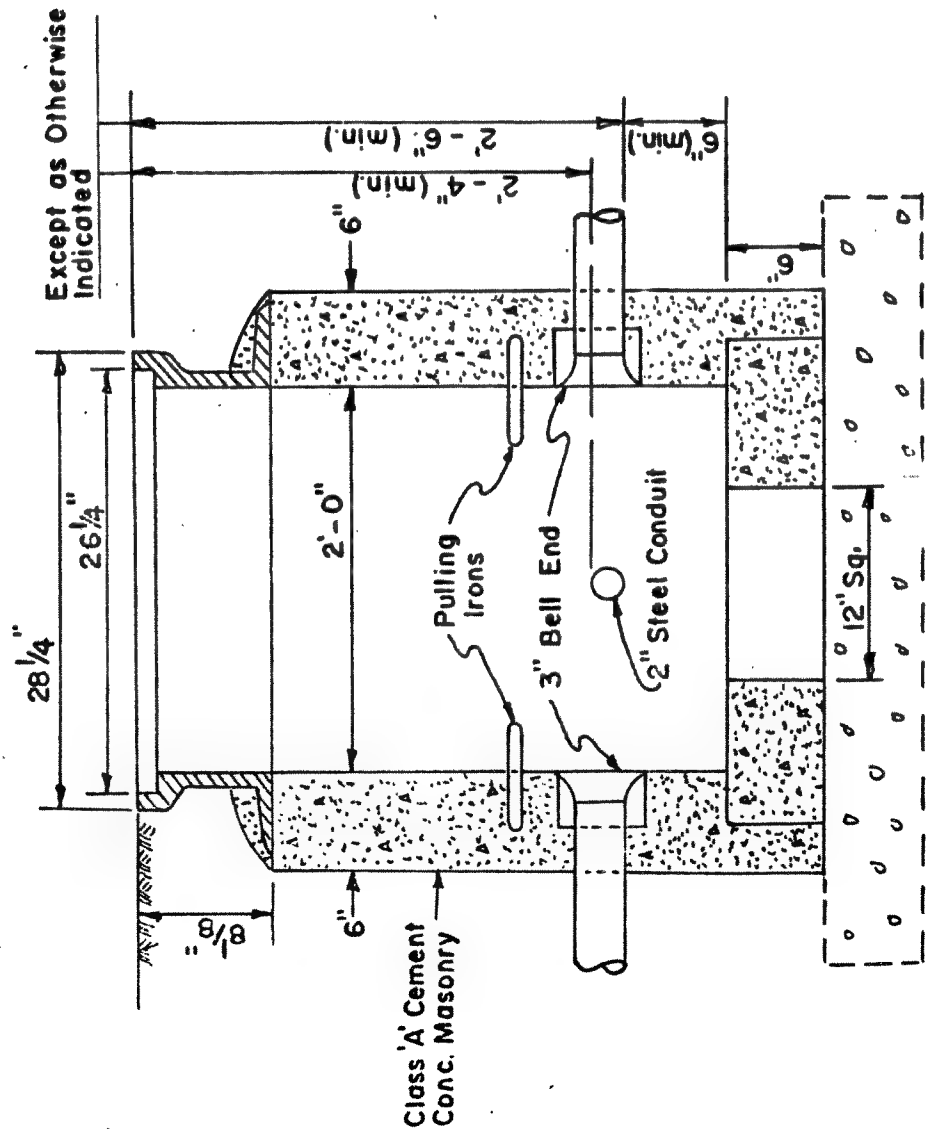
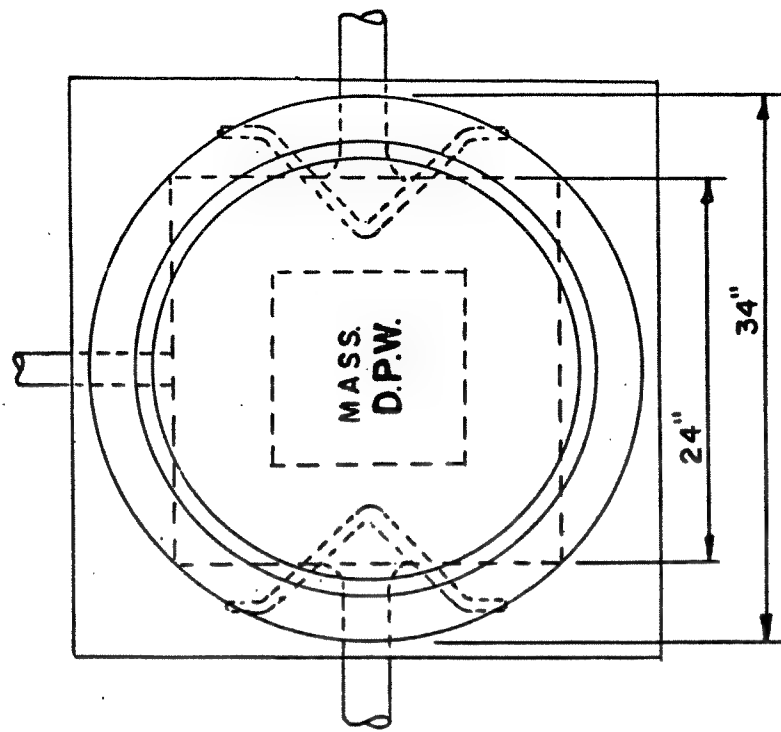
24 in. X 13 in. X 36 in. ELECTRIC HANDHOLE

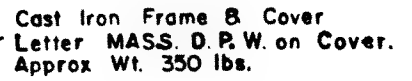


24in. X 24in. X 36in. ELECTRIC HANDHOLE



24 in. X 24 in. X 36 in. ELECTRIC HANDHOLE



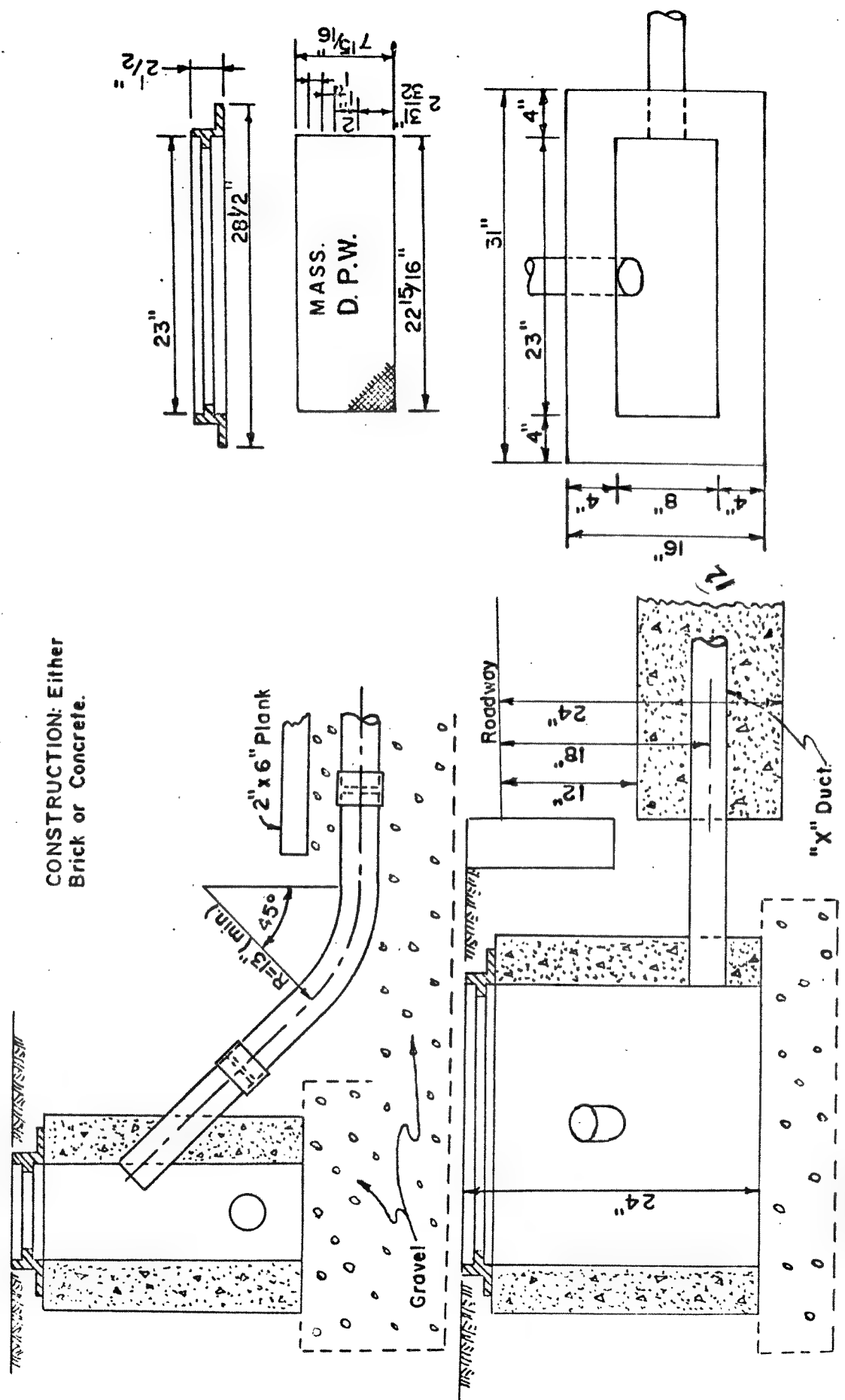


NOTE:
For the exact number, size
and orientation of the
conduits entering the handhole,
see the contract lighting
plans.

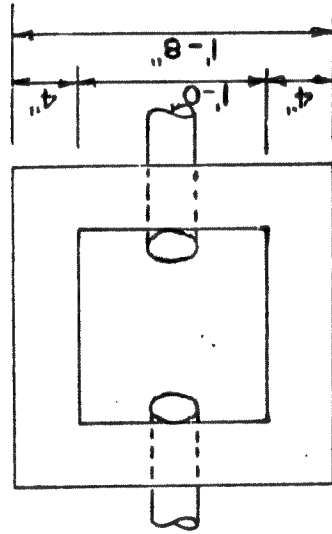
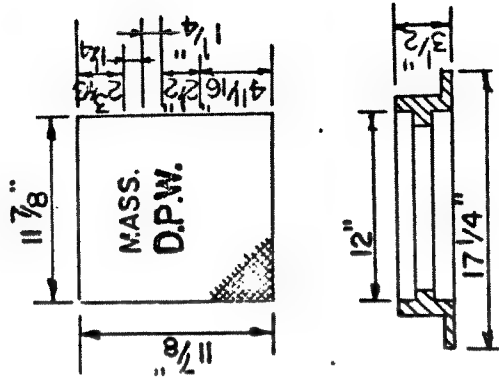


ELECTRIC HANDHOLE

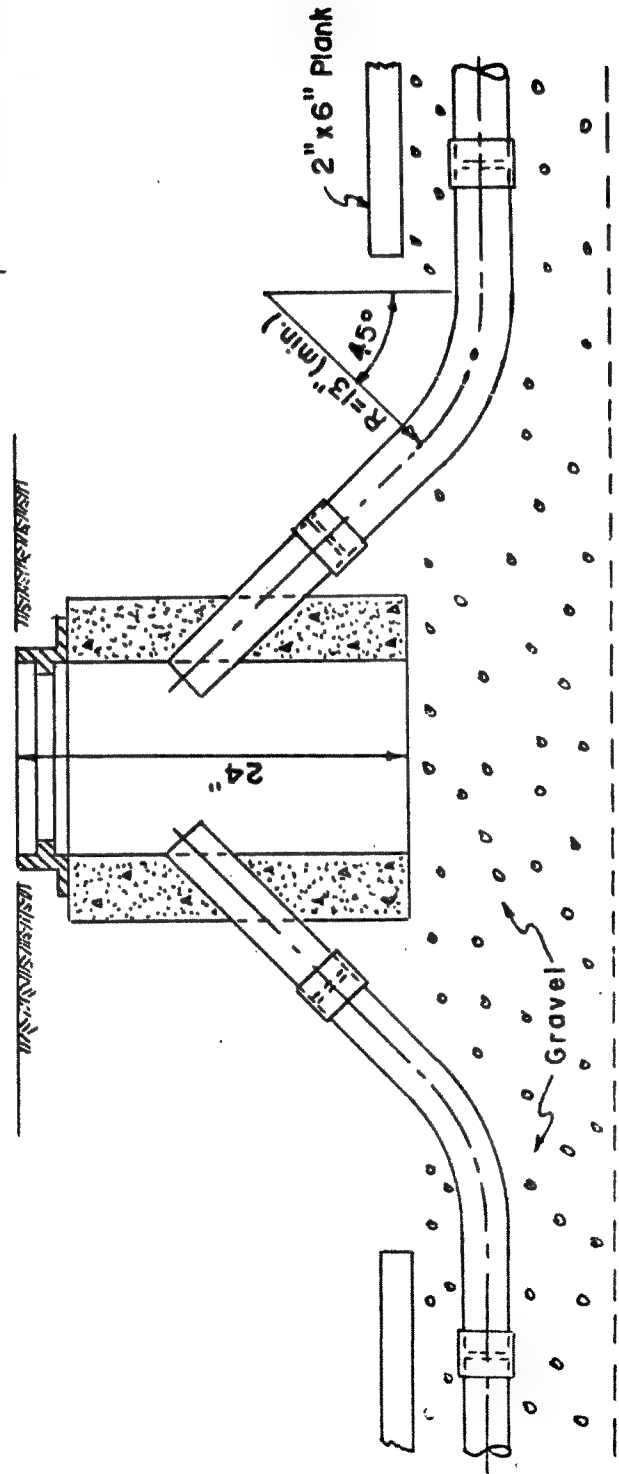
8 in. X 23 in. PULL BOX



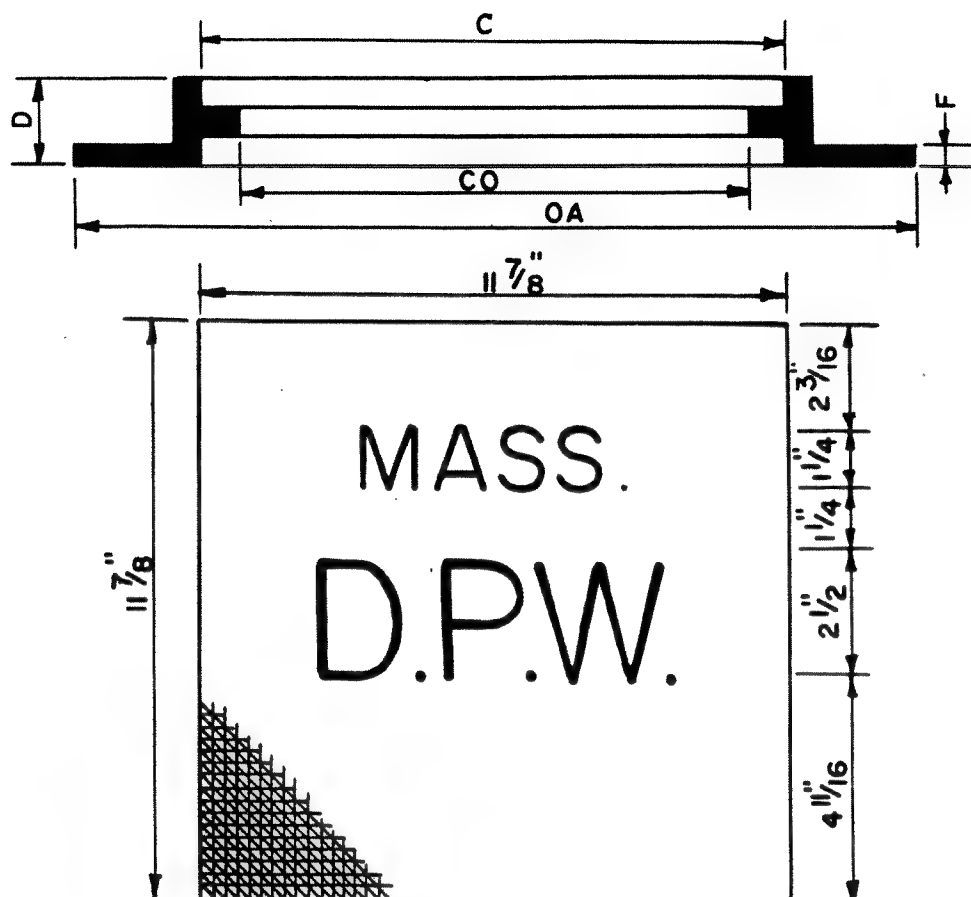
12 in. X 12 in. PULL BOX



CONSTRUCTION: Either
Brick or Concrete.

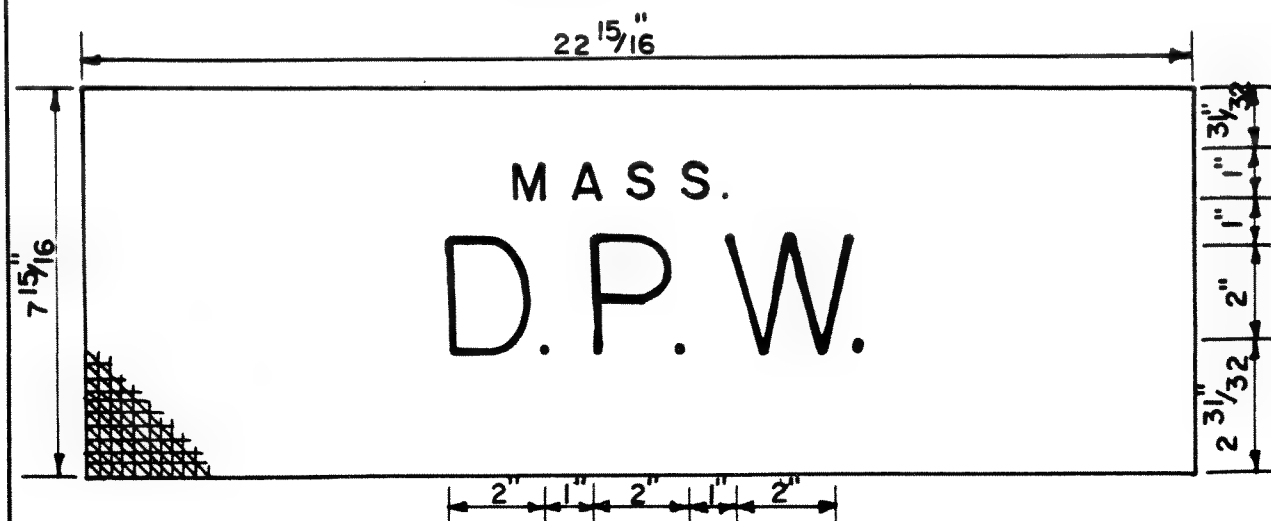


FRAME AND COVER FOR JUNCTION BOX



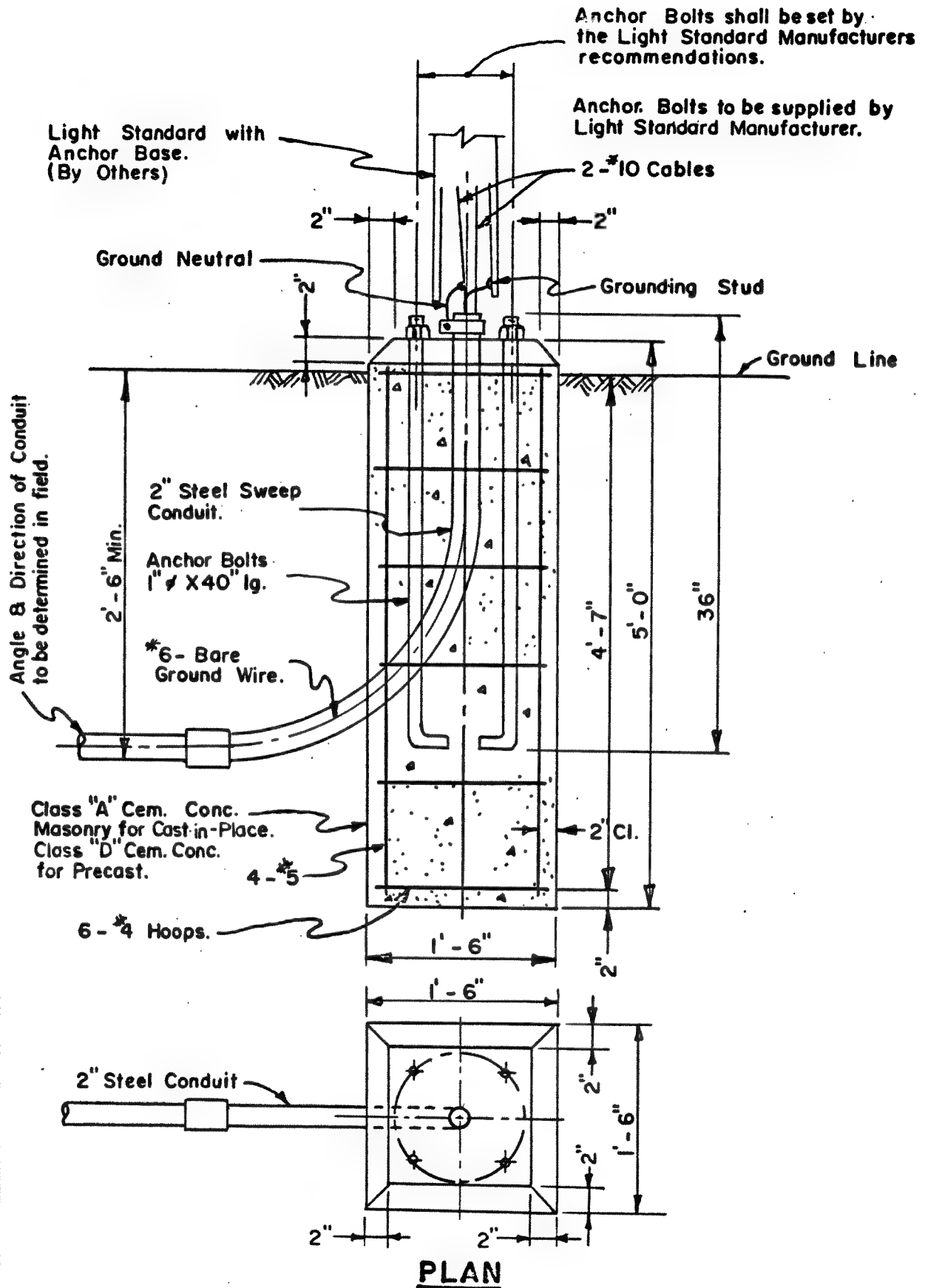
ALL DIMENSIONS IN INCHES

| SIZE OF COVER | DEPTH | CLEAR OPENING | OVERALL | FLANGE | APPROX. WEIGHT |
|---------------|-------|-----------------|-----------------|--------|----------------|
| C | D | CO | OA | F | W |
| 12 x 12 | 3 1/2 | 10 1/2 x 10 1/2 | 17 1/4 x 17 1/4 | 1/2 | 80 |
| 8 x 23 | 2 1/2 | 6 1/2 x 21 1/2 | 13 3/4 x 28 1/2 | 1/2 | 80 |

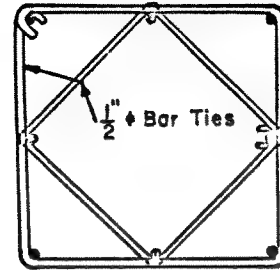
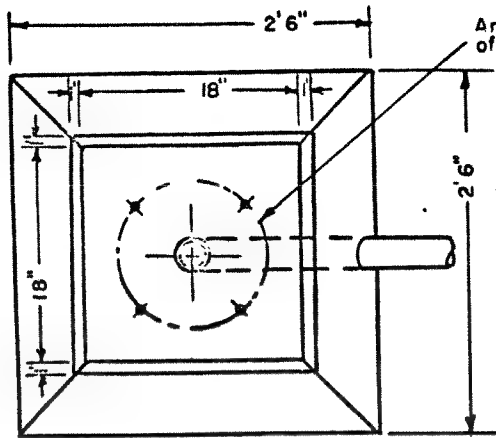


THE WORD MASS. HAS 1/4 SPACING.

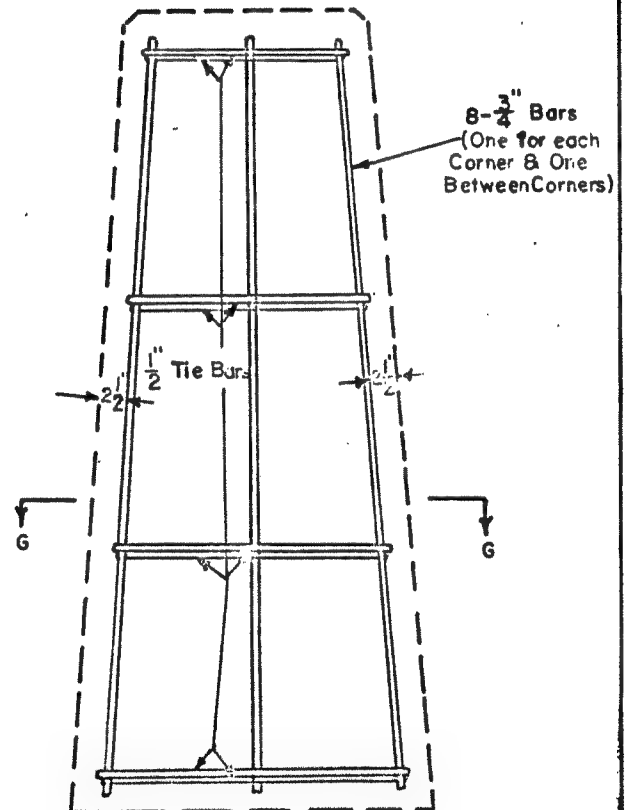
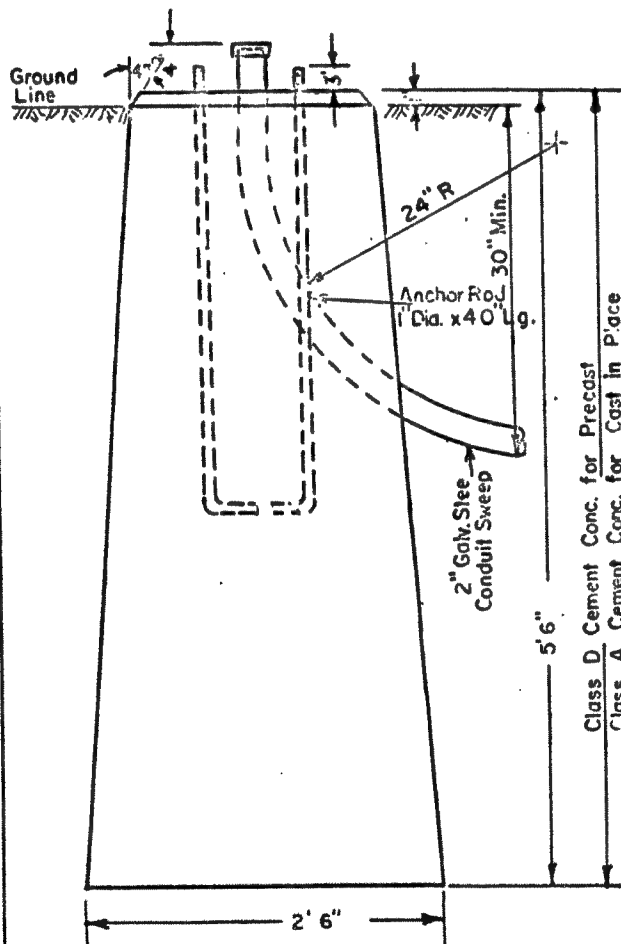
Scale: 1/4" = 1"



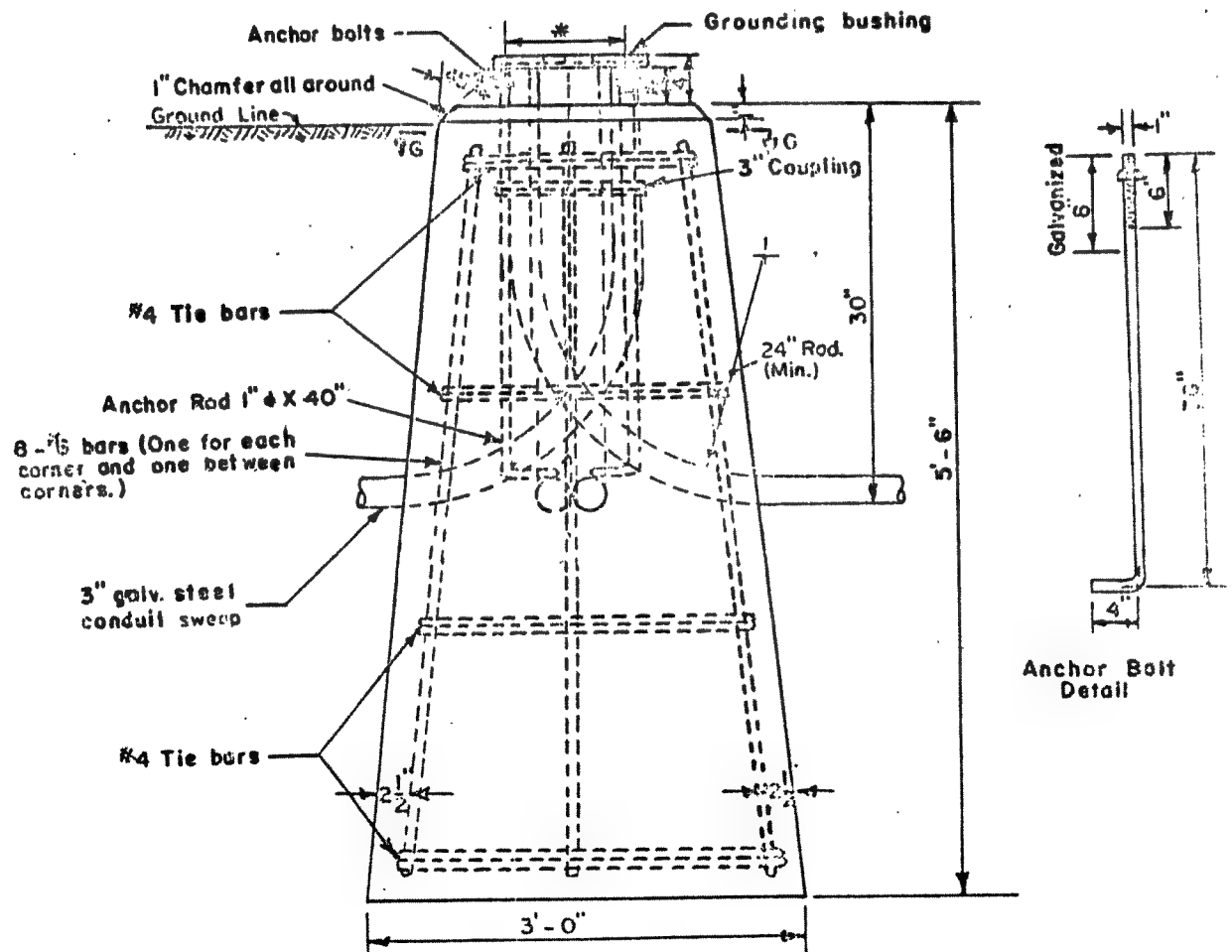
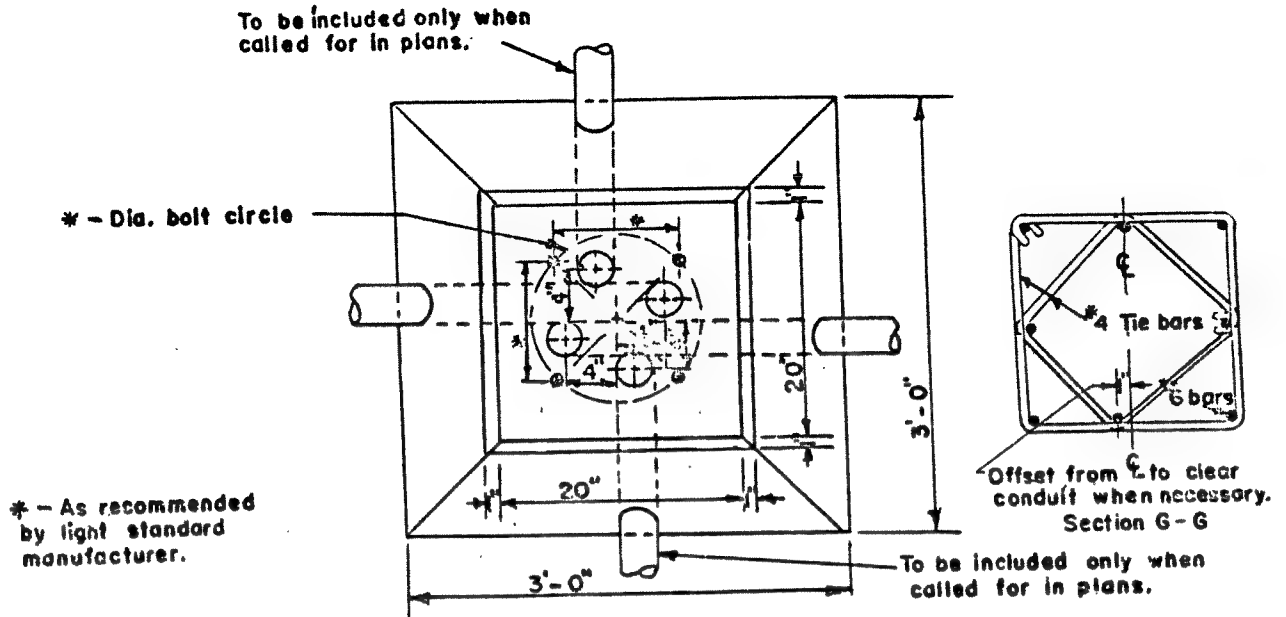
ANCHOR BASE FOUNDATION
(Precast or Cast in Place)



Section G - G



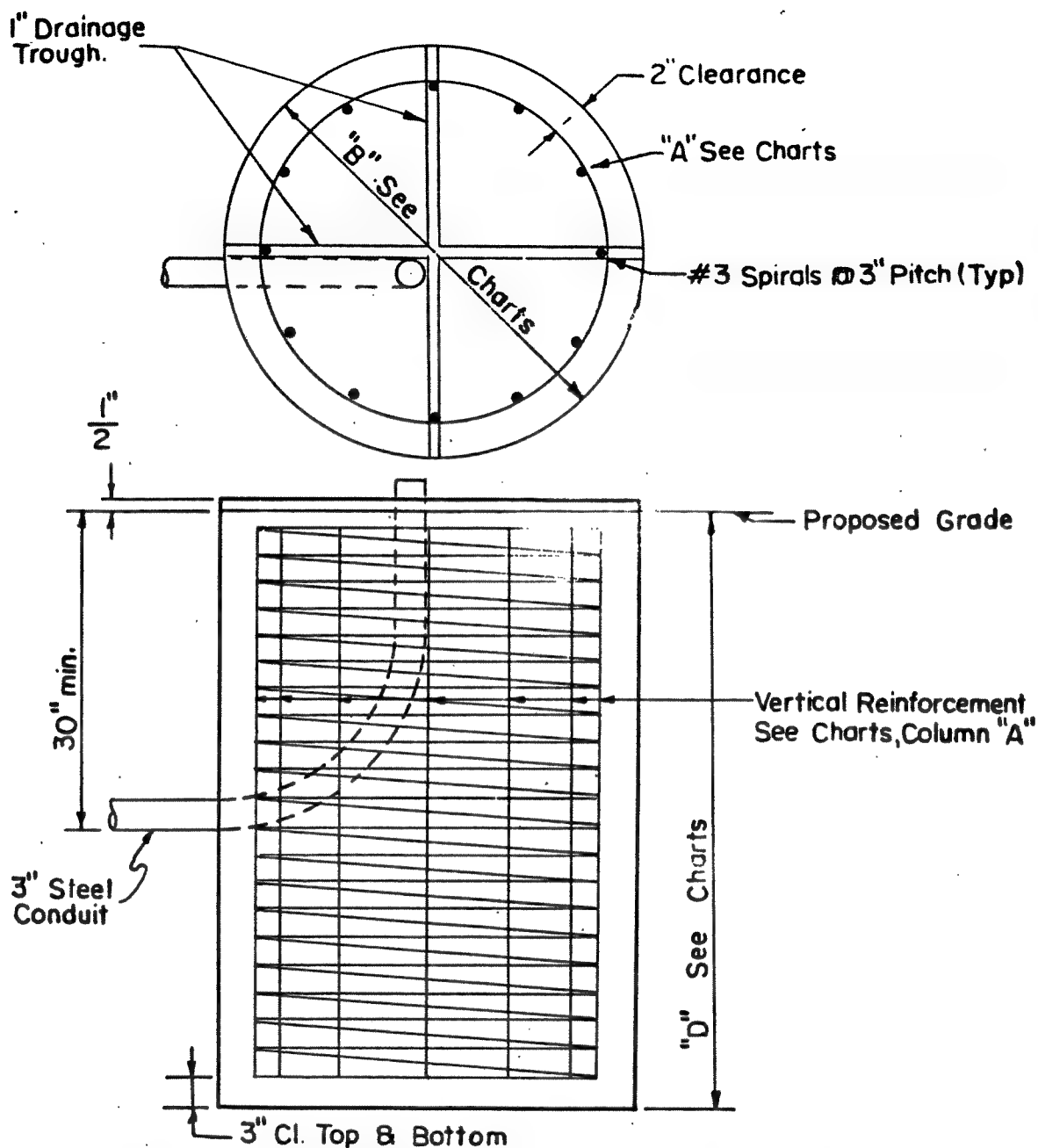
ROADWAY ILLUMINATION ANCHOR BASE FOUNDATION
(PRECAST OR CAST IN PLACE)
Scale: 3/4" = 1'-0"



TRANSFORMER BASE FOUNDATION

Scale: $\frac{3}{4}$ " = 1'-0"

TYPICAL LIGHT STANDARD FOUNDATION

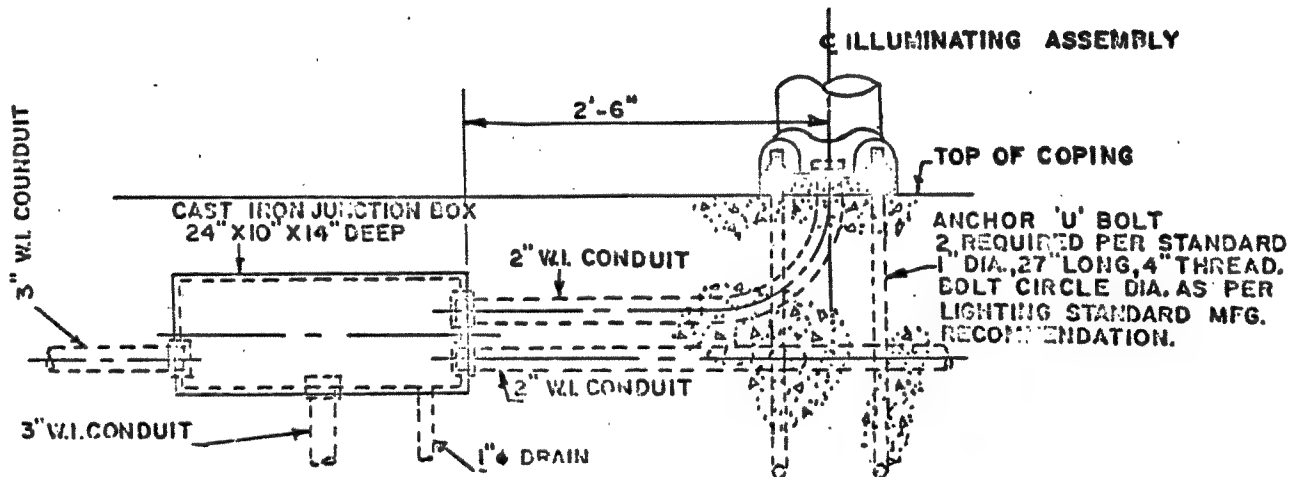
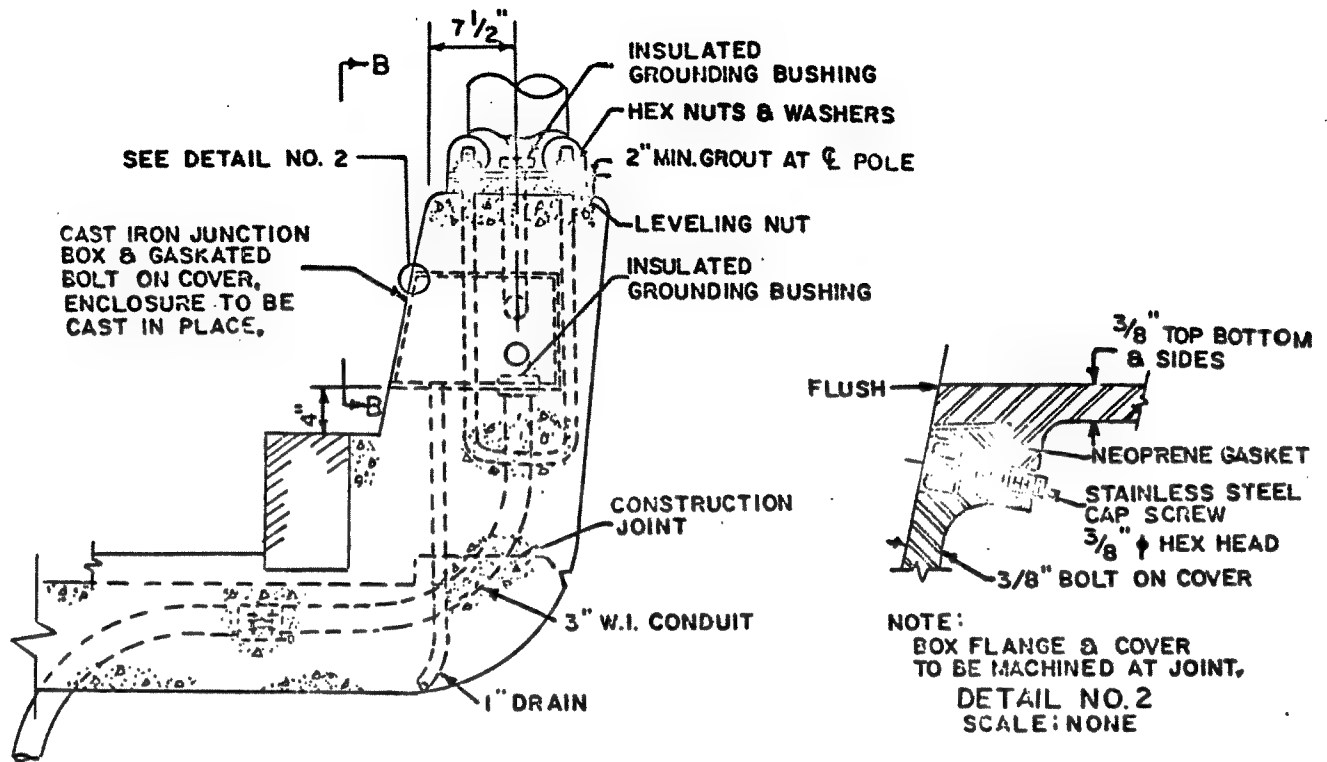


FOUNDATION DESIGN CHART

| Mounting Height | Diameter "B" | Depth "D" | Vertical Reinforcement "A" | Std. Detail Number |
|-----------------|--------------|-----------|----------------------------|--------------------|
| 30'-40' | 3'-0" | 7'-0" | 8 - #5 | SD 3. 013 |
| 40'-100' | 3'-0" | 10'-0" | 12 - #5 | SD 3. 014 |

NOTES:

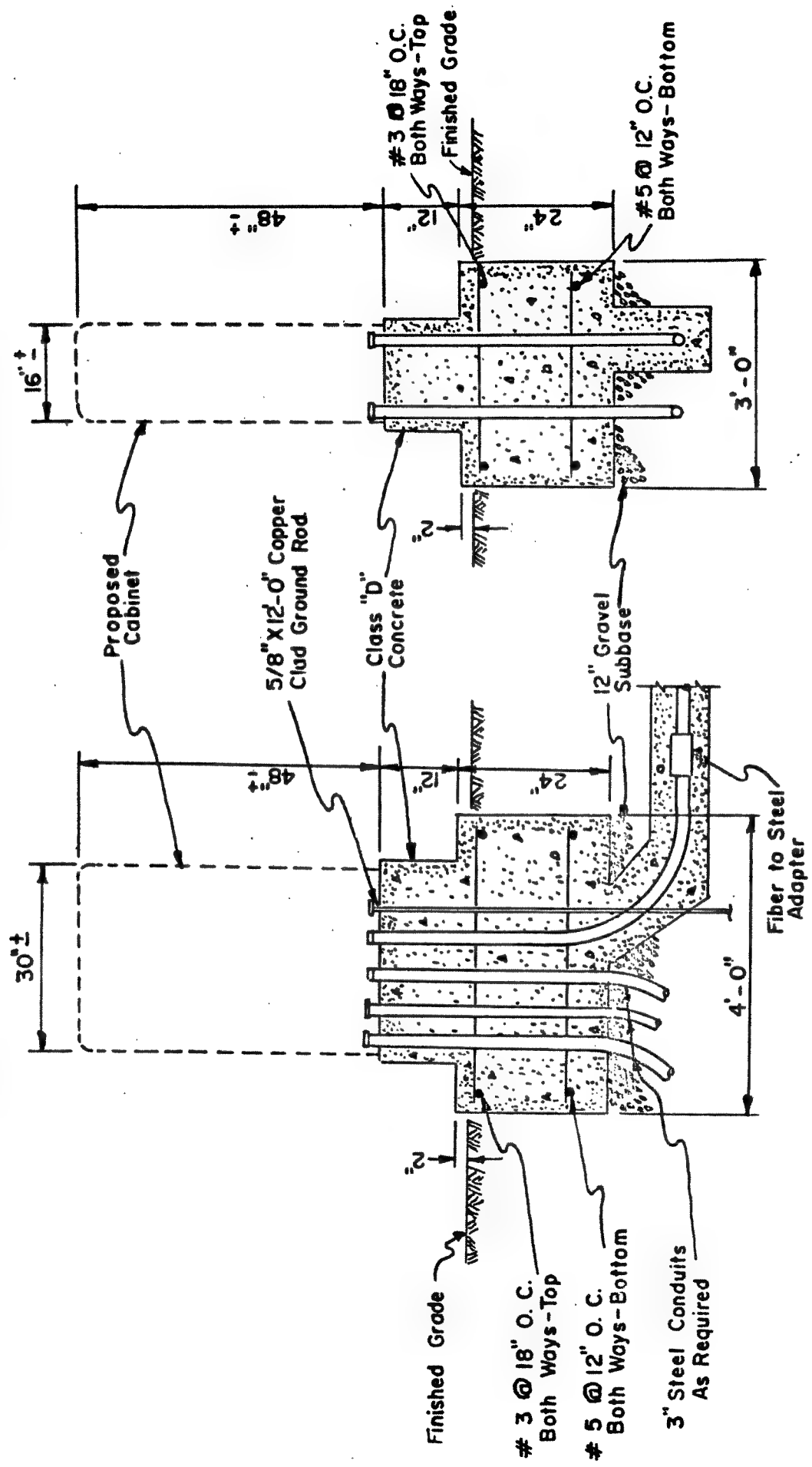
1. Cement concrete for foundations to be class 'A' cement concrete masonry.
2. A minimum slope of 1/8" per. ft. from edge of base plate to face of concrete.
3. The actual depth of foundation will be the "D" dimension above plus the 1/2" reveal.
4. The anchor bolts shall be supplied by the light standard manufacturer. The manufacturer shall also supply a template for setting the bolts and shall indicate the necessary projection.



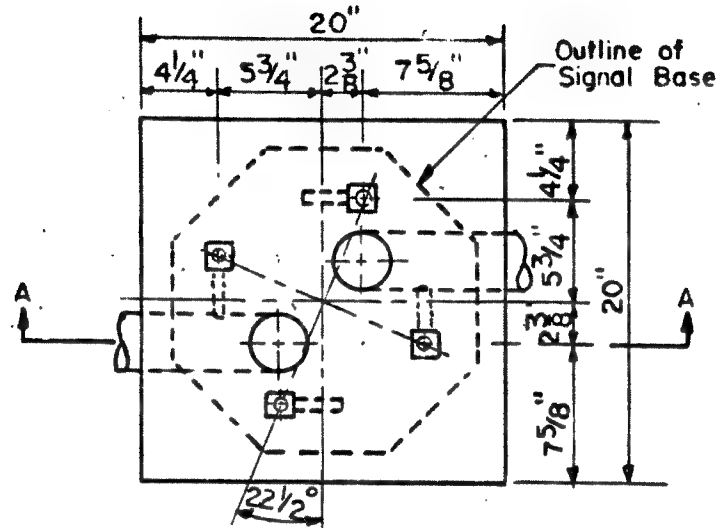
ELEVATION B-B
SCALE: 3/4" = 1'-0"

VIADUCT LIGHTING DETAILS

LIGHTING LOAD CENTER FOUNDATION

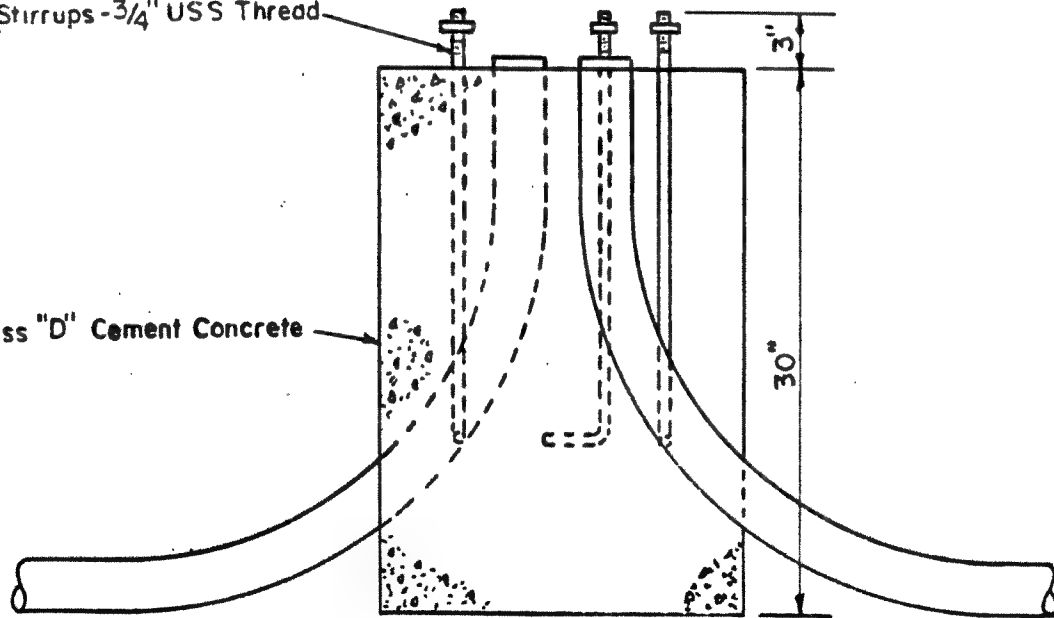


CONCRETE BASE STANDARD TRAFFIC SIGNAL POST



Maximum distance between
bolts $12\frac{3}{4}$ "
Stirrups - $\frac{3}{4}$ " USS Thread

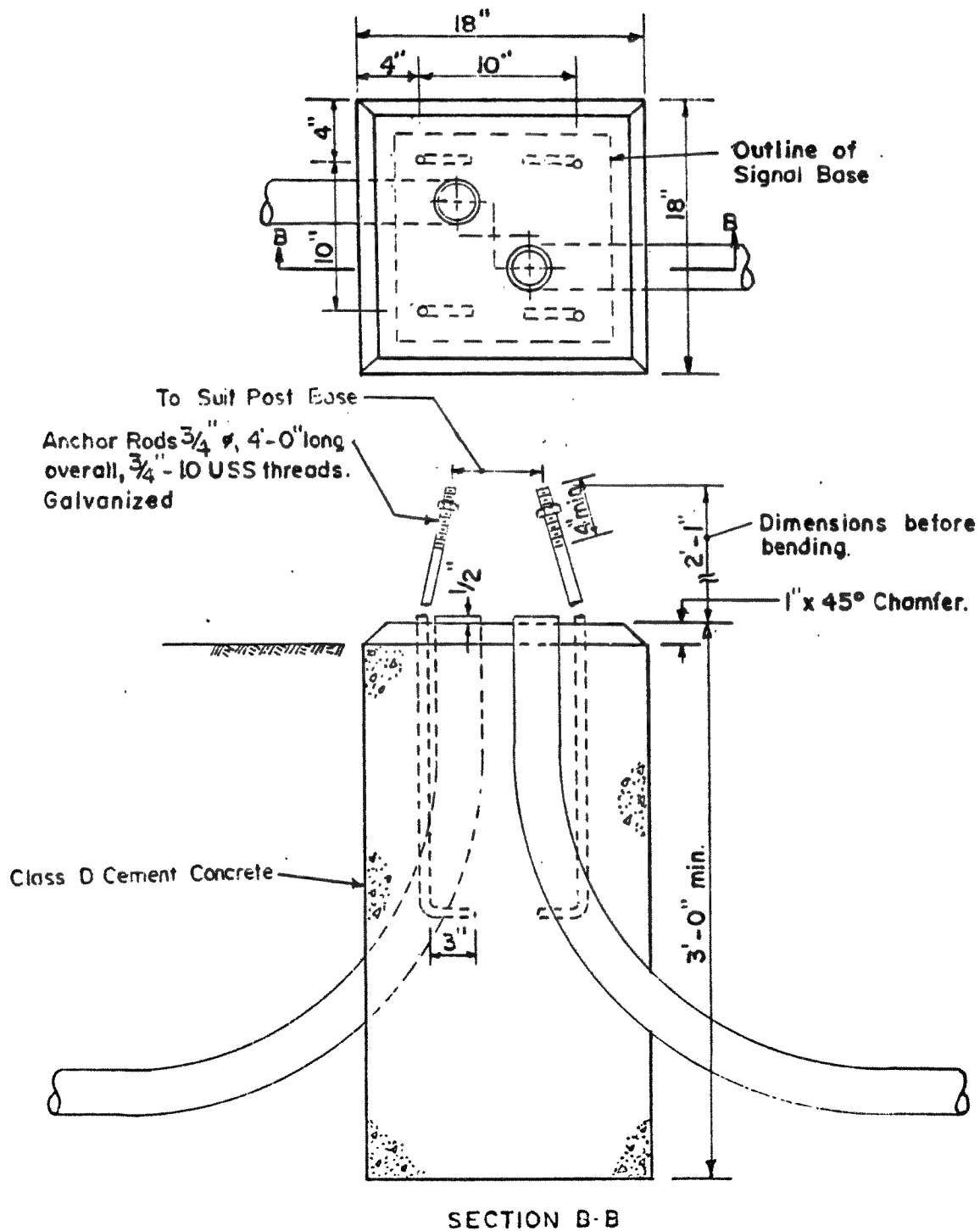
Class "D" Cement Concrete



SECTION A-A

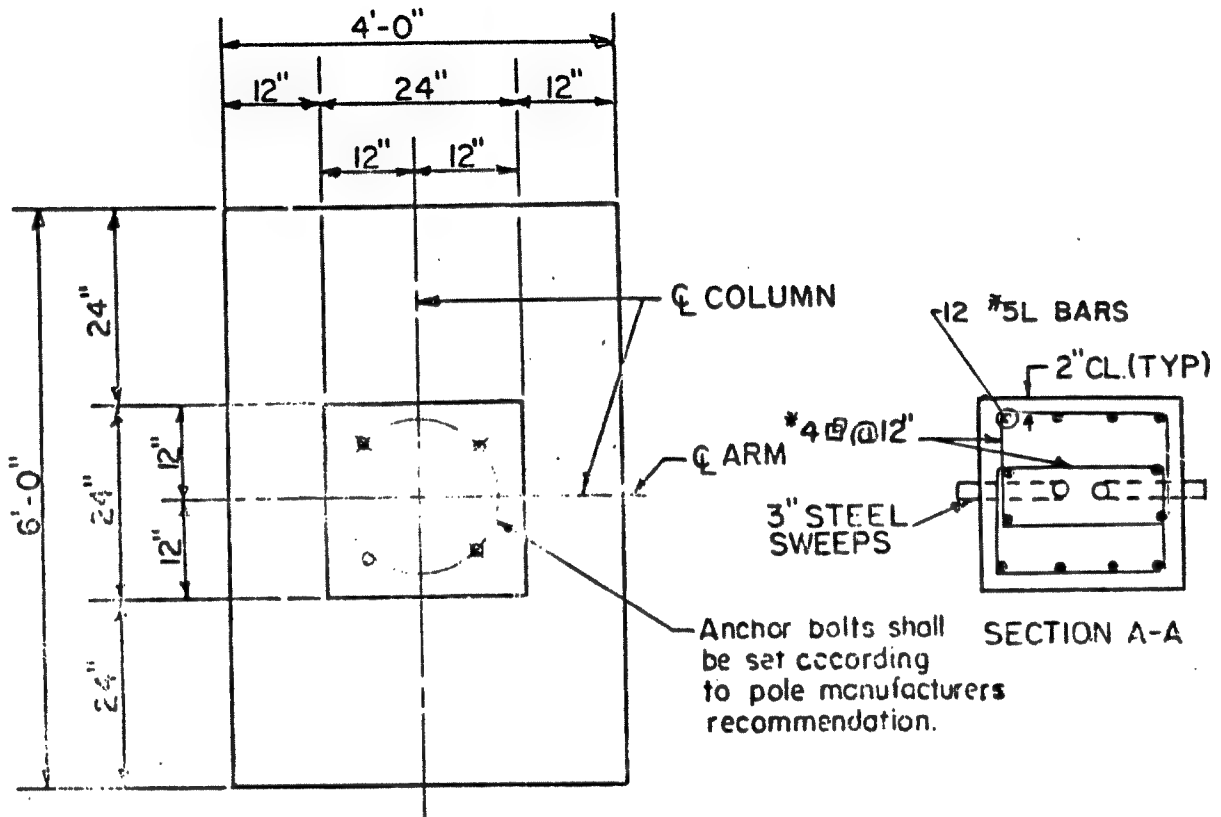
Scale: $\frac{3}{32}$ " = 1"

CONCRETE BASE PEDESTAL TYPE

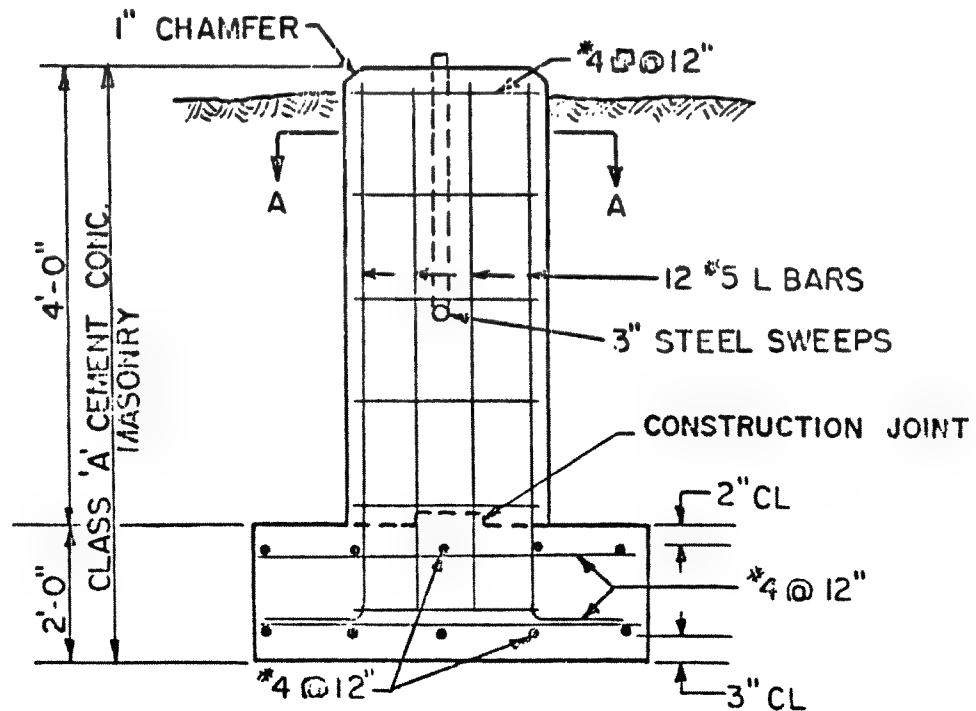


Scale $\frac{3}{32}" = 1"$

TRAFFIC SIGNAL MAST ARM FOUNDATION



GRANULAR BACKFILL
THOROUGHLY COMPACTED

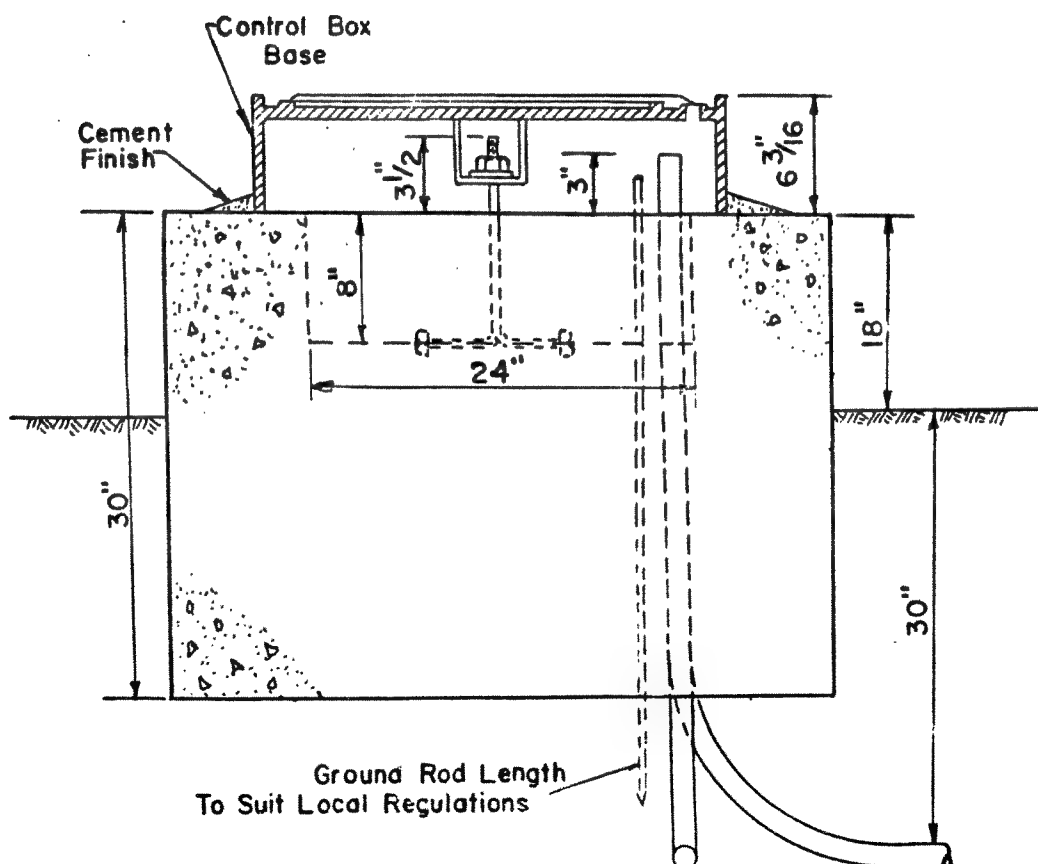
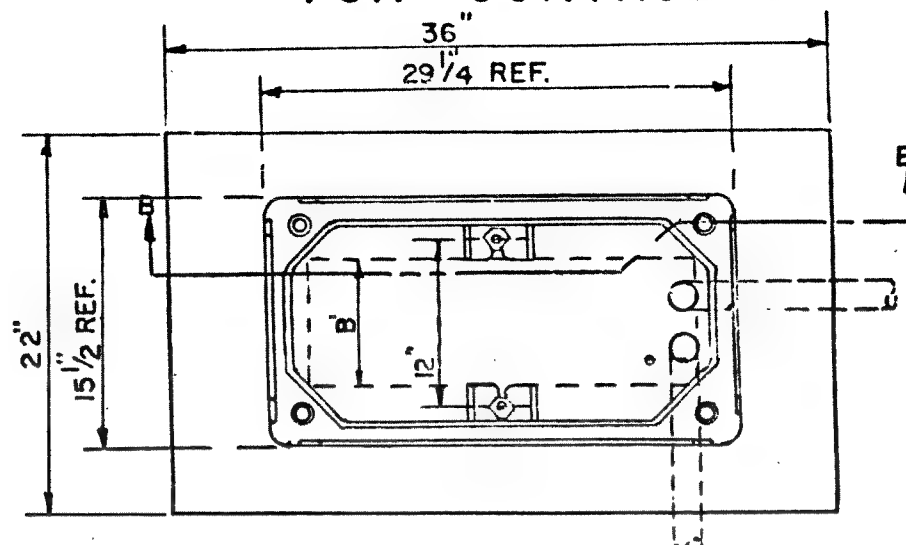


May 18, 1937

Scale: $\frac{1}{2}'' = 1'$

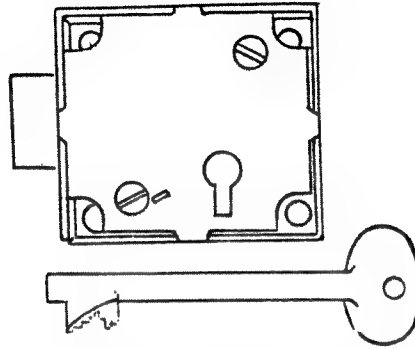
REVISED: July 12, 1966

CONCRETE BASE
FOR CONTROL BOX

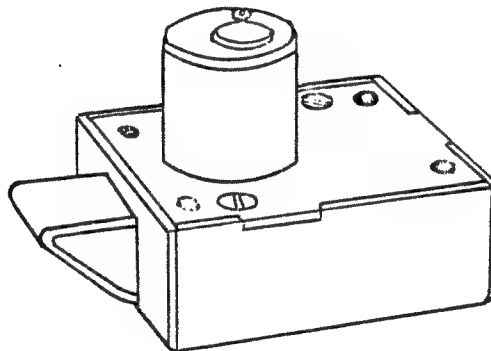


SECTION B-B

TRAFFIC SIGNAL CONTROL CABINET LOCKS & KEYS

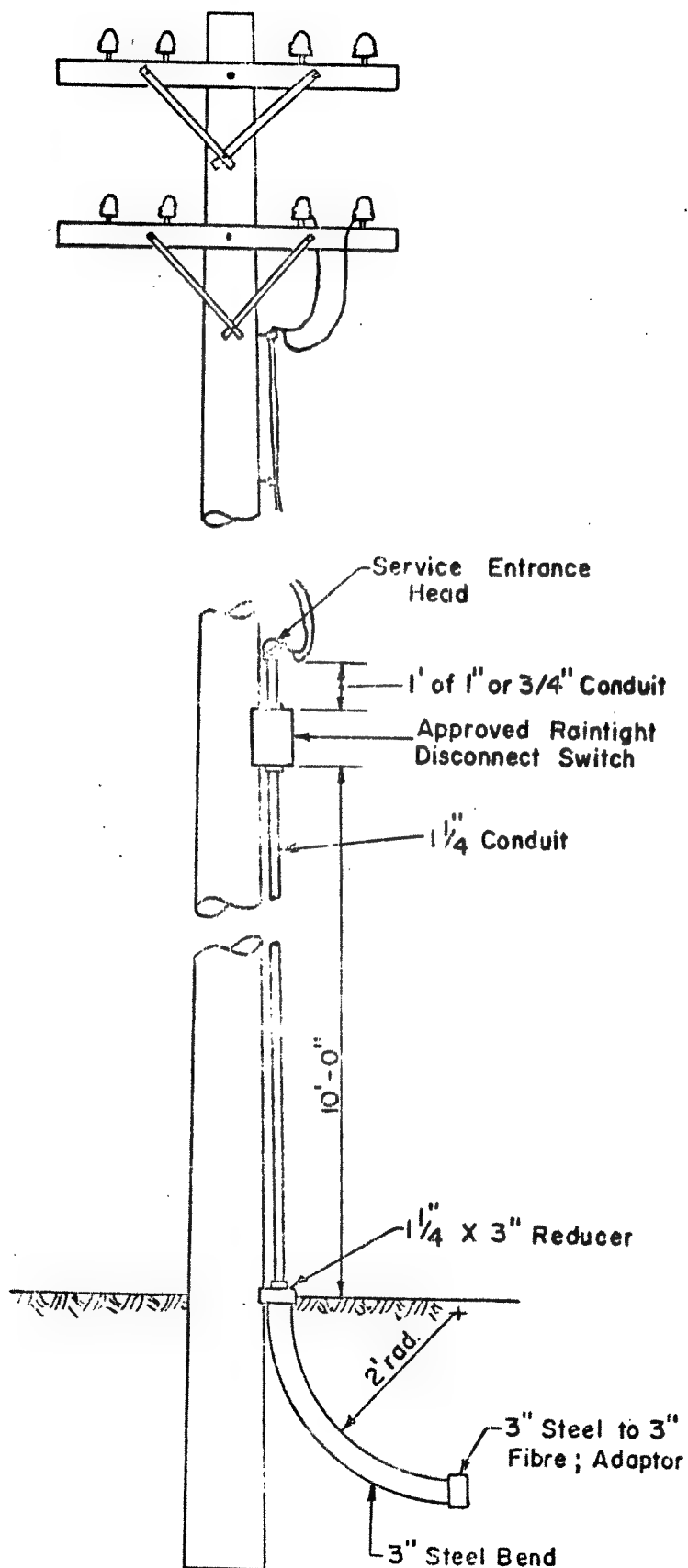


CONTROL BOX LOCK & KEY
POLICE PANEL

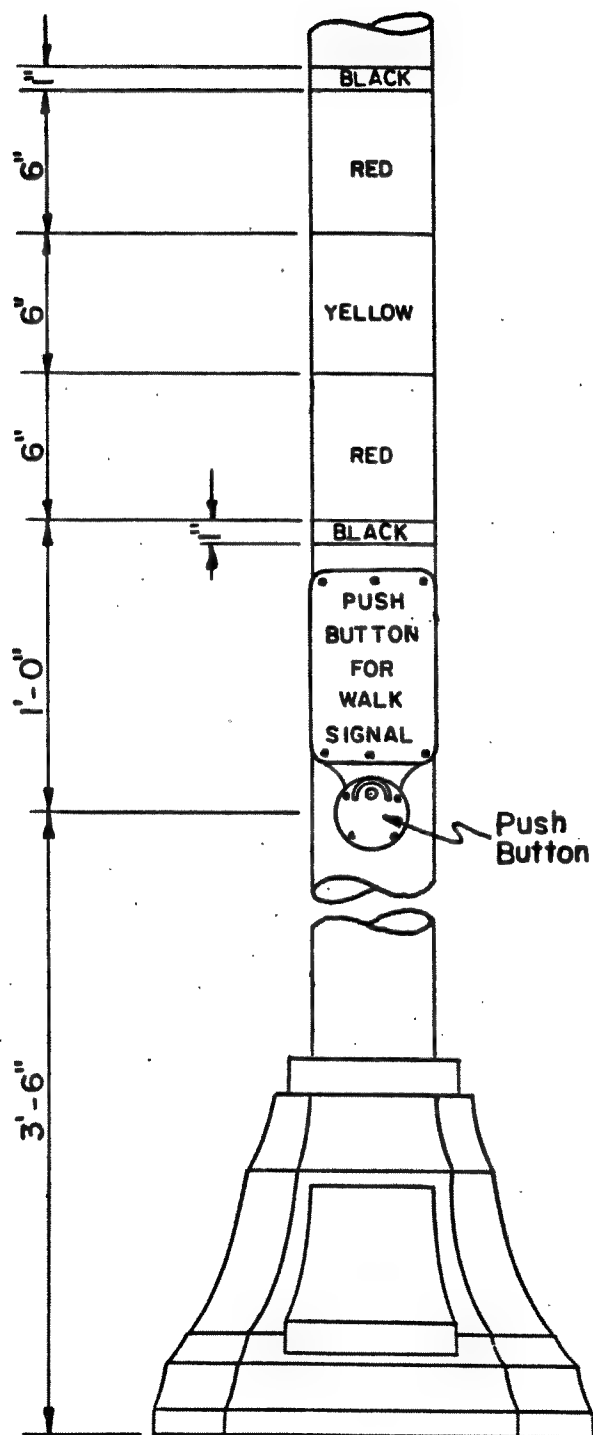


CYLINDER LOCK & KEY
CONTROLLER CABINET

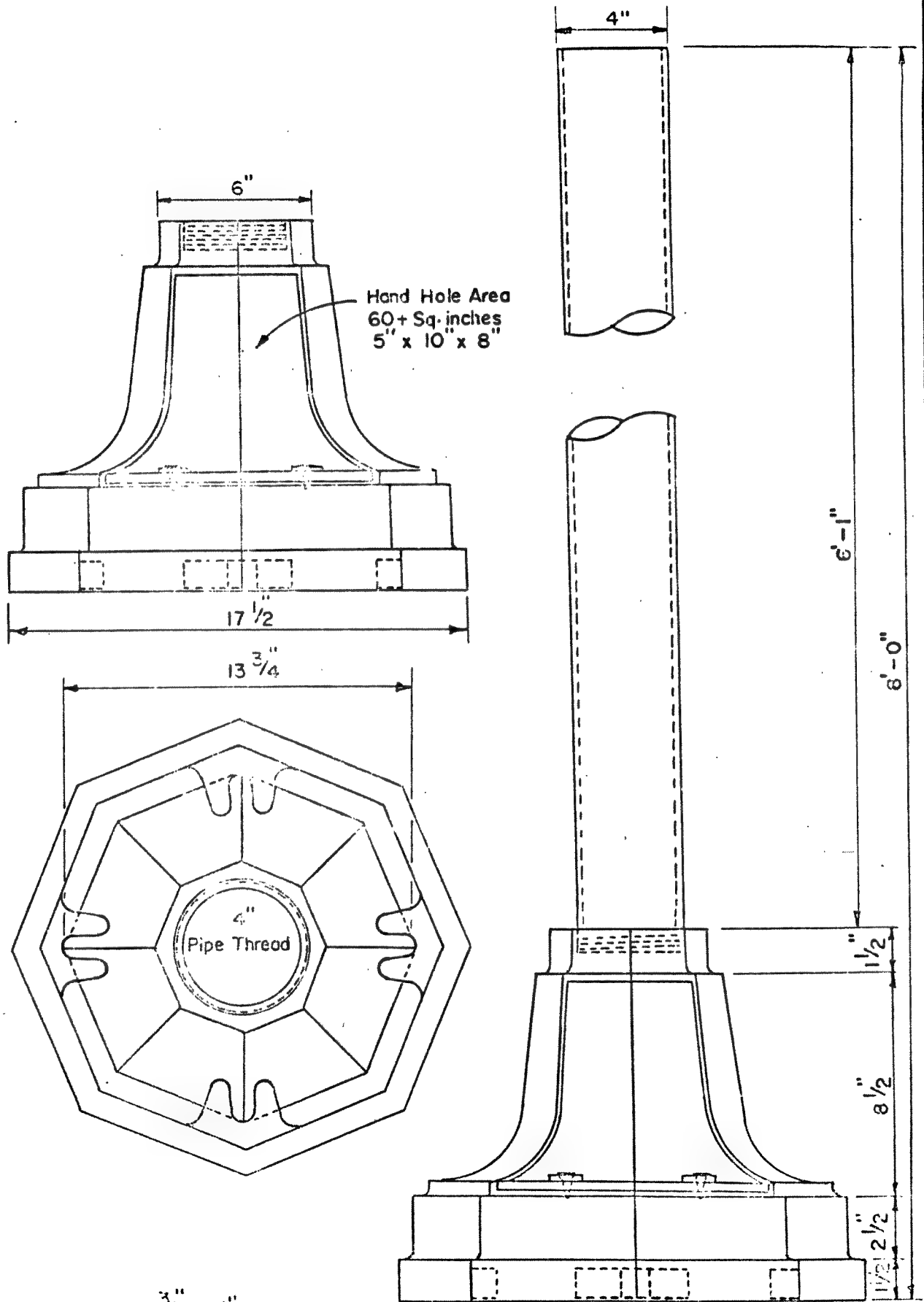
OVERHEAD TRAFFIC SIGNAL SERVICE CONNECTION



STANDARD MARKING ON SIGNAL POSTS TO INDICATE PEDESTRIAN PUSH BUTTON LOCATION

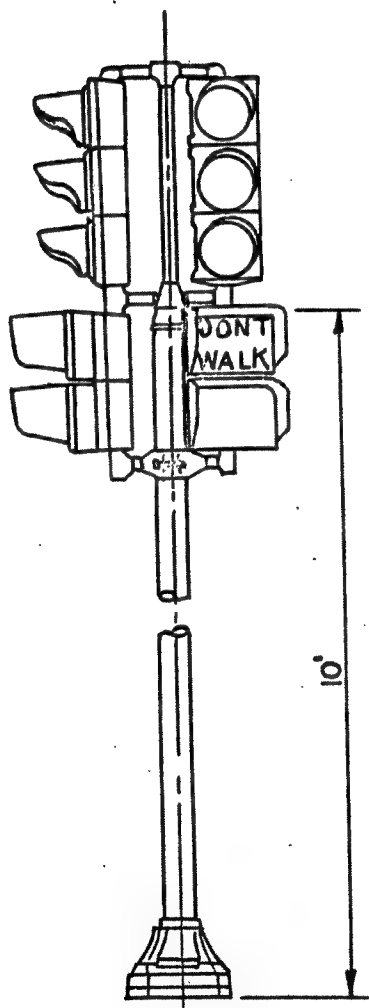


STANDARD TRAFFIC SIGNAL POST & BASE



Scale: 3/16" = 1"

STANDARD SIGNAL POST WITH SIGNAL & PEDESTRIAN HOUSINGS

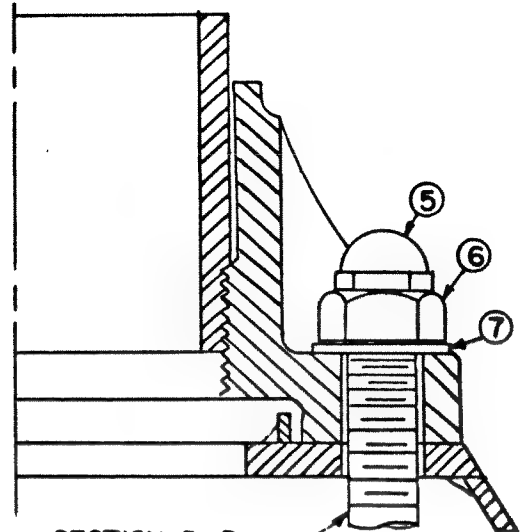


Bottom of Pedestrian Housing Shall Be Mounted Not Less Than 7 Feet, Nor More Than 10 Feet Above The Sidewalk Level And So That There Is A Signal In The Line Of Vision Of Pedestrians Crossing In Any Cross Walk.

TRAFFIC SIGNAL POST PEDESTAL TYPE

| TYPE | POST HT. | H | S | PIPE SHAFT |
|------|----------|--------|--------|------------|
| 3A | 8'-0" | 8'-0" | 5'-10" | 6'-1" |
| 3B | 9'-0" | 9'-0" | 6'-10" | 7'-1" |
| 3C | 10'-0" | 10'-0" | 7'-10" | 8'-1" |
| 3P | 5'-0" | 5'-0" | 2'-10" | 3'-1" |

4" Std. Pipe Shaft. Bottom End
to be Threaded Outside,
4" Std. Pipe Thread.



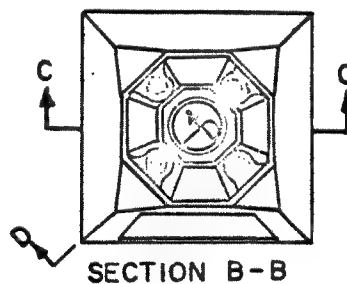
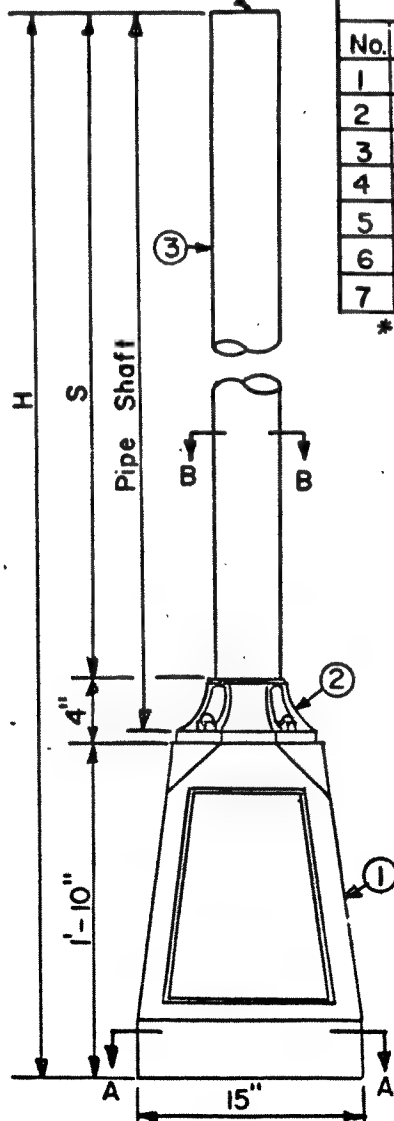
SECTION D-D

Top Ends of Anchor Rods to Have
3/4"-10 Threads 4" Long.

Scale: 1/2" = 1'

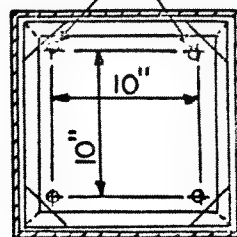
| BILL OF MATERIAL | | | |
|------------------|----------------------|------|----------------------|
| No. | Name | Qua. | Material |
| 1 | Pedestal Base | 1 | Sheet Steel |
| 2 | Column Base * | 1 | Malleable Iron |
| 3 | Pipe Shaft | 1 | Steel |
| 4 | Anchor Rods | 4 | Steel Cadmium Plated |
| 5 | 3/4"-10 Hex Cap Nuts | 4 | Brass |
| 6 | 3/4"-10 Hex Nuts | 4 | Steel Cadmium Plated |
| 7 | Flat Washers | 4 | Steel Cadmium Plated |

* See Column Base Drawing



SECTION B-B

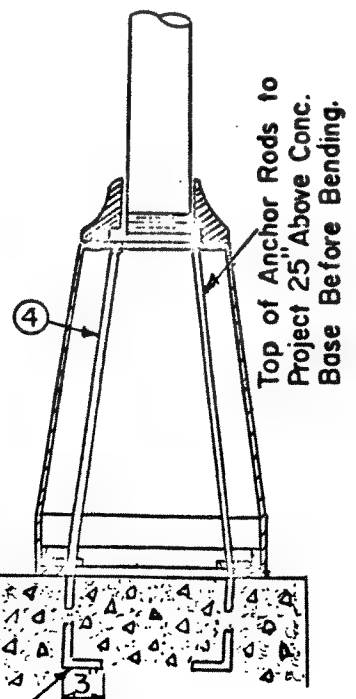
4-3/4"X 48" Long Steel
Anchor Rods.



SECTION A-A

Bottom Ends of Anchor
Rods to be Bent as Shown.

3000 lb. Cem. Conc. Base 20" Sq.
By 30" Deep With Anchor Rods as
Shown



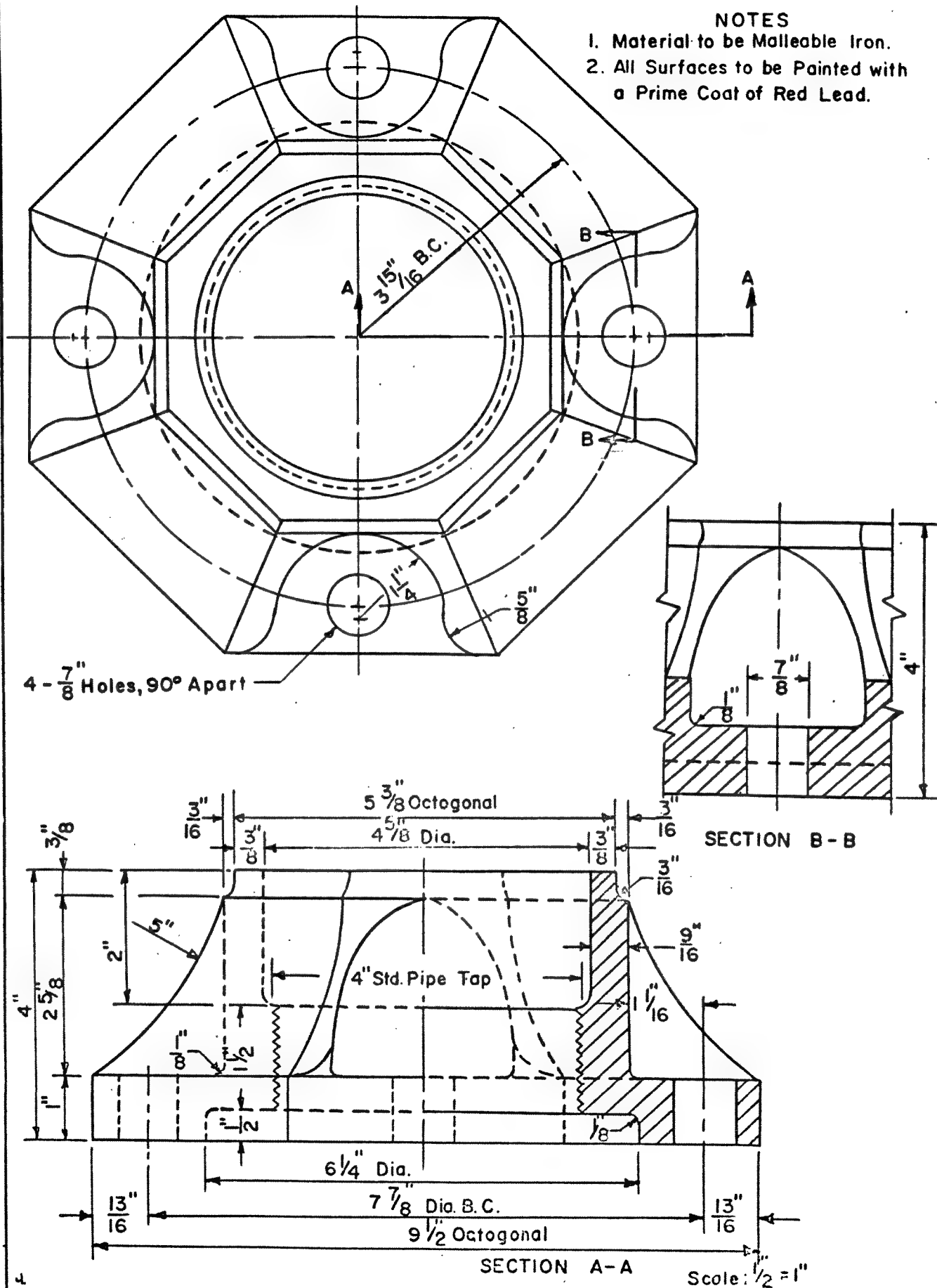
SECTION C-C

Scale: 1" = 1'

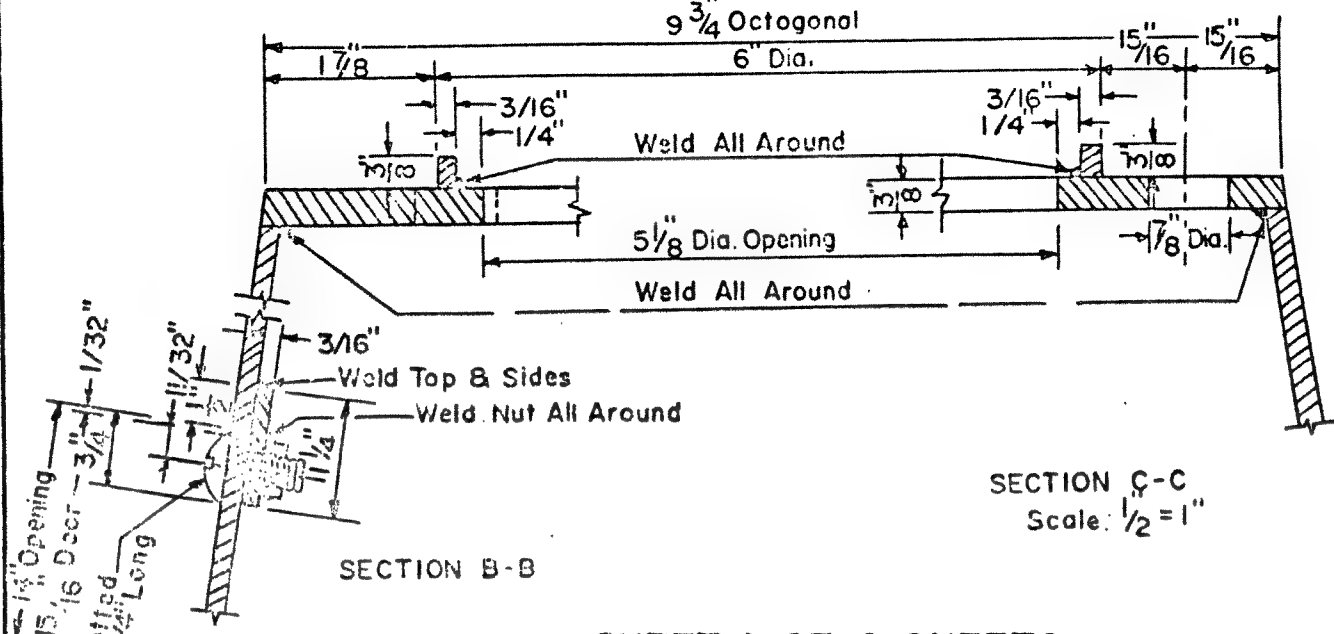
COLUMN BASE PEDESTAL TYPE

NOTES

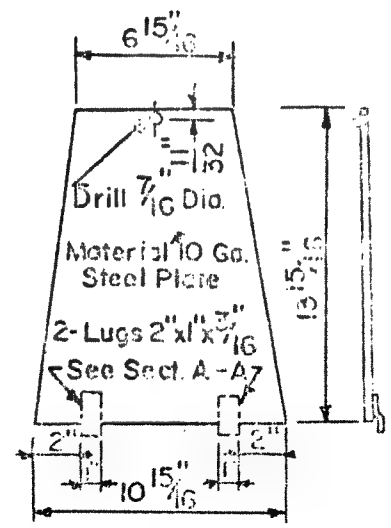
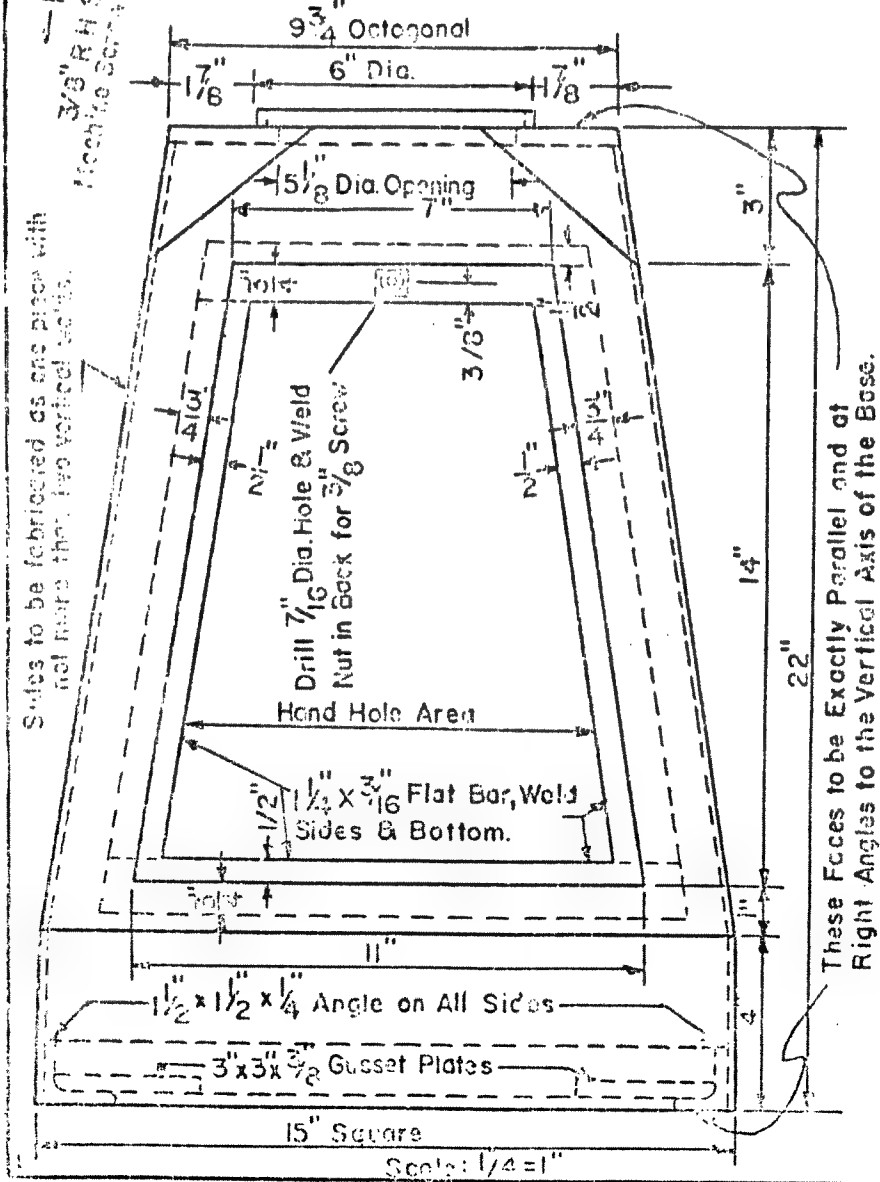
1. Material to be Malleable Iron.
2. All Surfaces to be Painted with a Prime Coat of Red Lead.



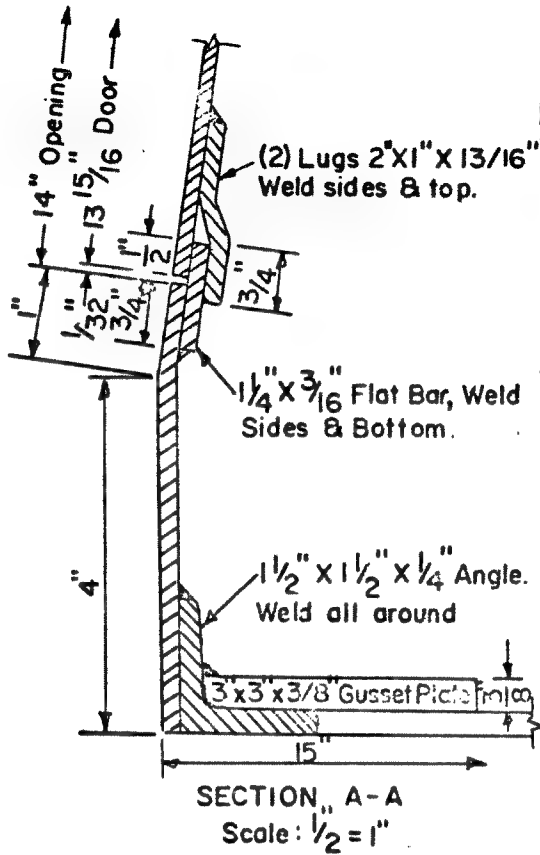
PEDESTAL BASE TRAFFIC SIGNAL POST



SHEET 1 OF 2 SHEETS



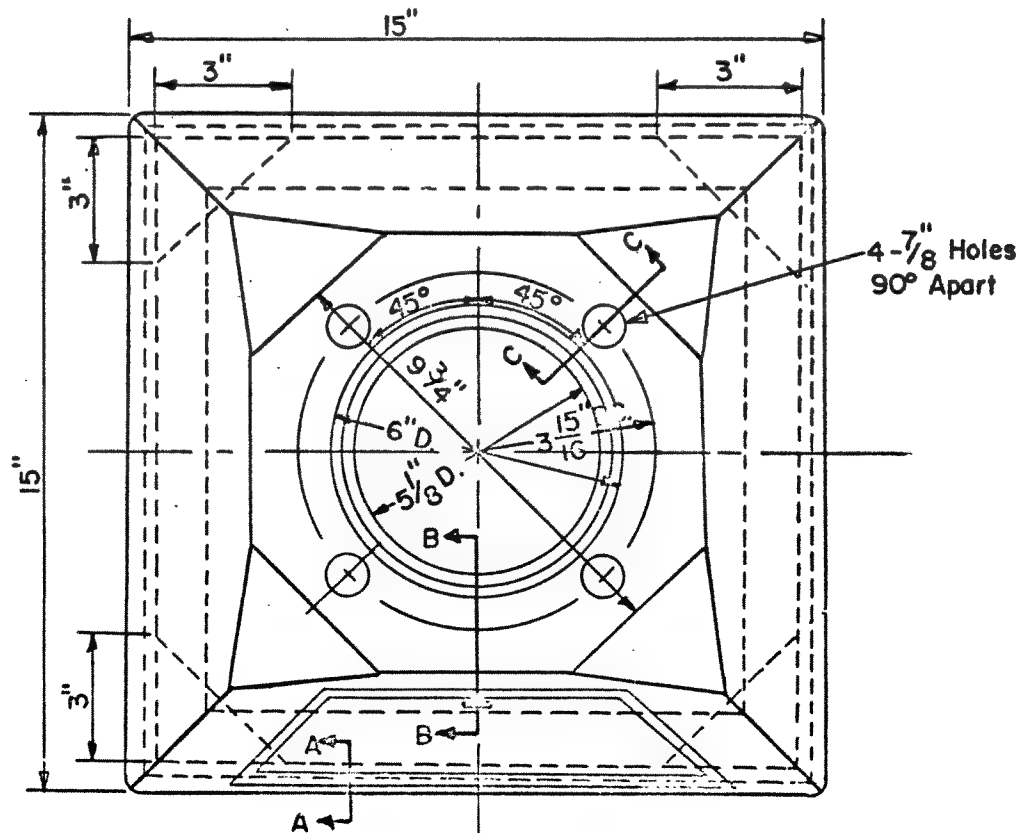
PEDESTAL BASE
TRAFFIC SIGNAL POST



NOTES

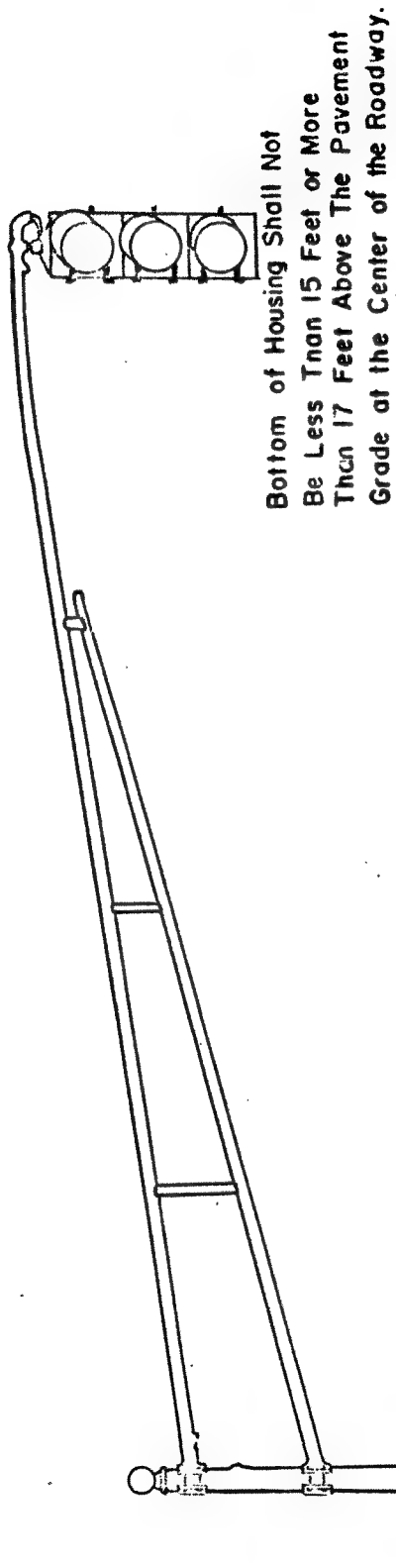
1. All welds to be continuous & of std. proportions
2. All exterior joints to be watertight.
3. Sides of base to be fabricated of 10 gauge (min. thickness) sheet steel. Top to be fabricated from 3/8" steel plate.
4. All material & workmanship are to be to the complete satisfaction of the Department of Public Works.
5. All exterior welds to be ground smooth after fabrication.
6. Entire Pedestal Base to be Hot-Dipped Galvanized and all surfaces to be prepared for paint adherence.

SHEET 2 OF 2 SHEETS



Scale: $\frac{1}{4}'' = 1''$

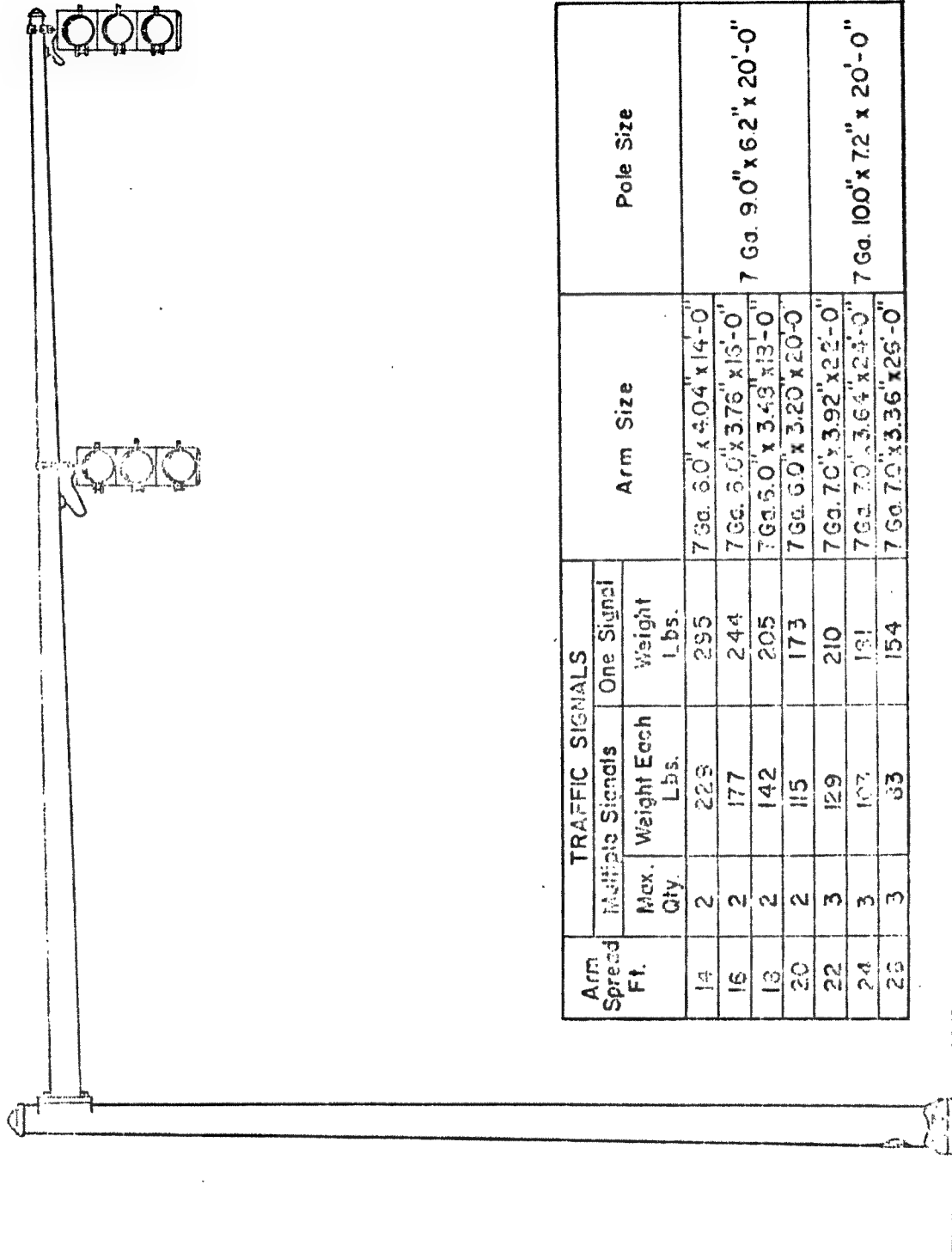
MAST ARM



Mast Arms shall be wired from base to housing with Stranded Type 2 Traffic Signal Cable; or with Type 5 Traffic Signal Head Wire protected with Flexible Metal Conduit (liquid-tight as specified in subsection M5.07.2B) at the junction of Arm and Signal Heads and when permitted by the Engineer, at the junction of Shaft and Arm.

MONOLEVER SIGNAL POLE

45



Anchor Bolts Are Set To Manufactures Specification.

EIGHT INCH TRAFFIC SIGNAL ASSEMBLY

HOUSING AND DOOR

LENS

TWIST ON VISOR

DOOR GASKET

LENS GASKET

REFLECTOR RING

REFLECTOR RING
SPRING

LAMP

REFLECTOR

ATTACHING WASHERS

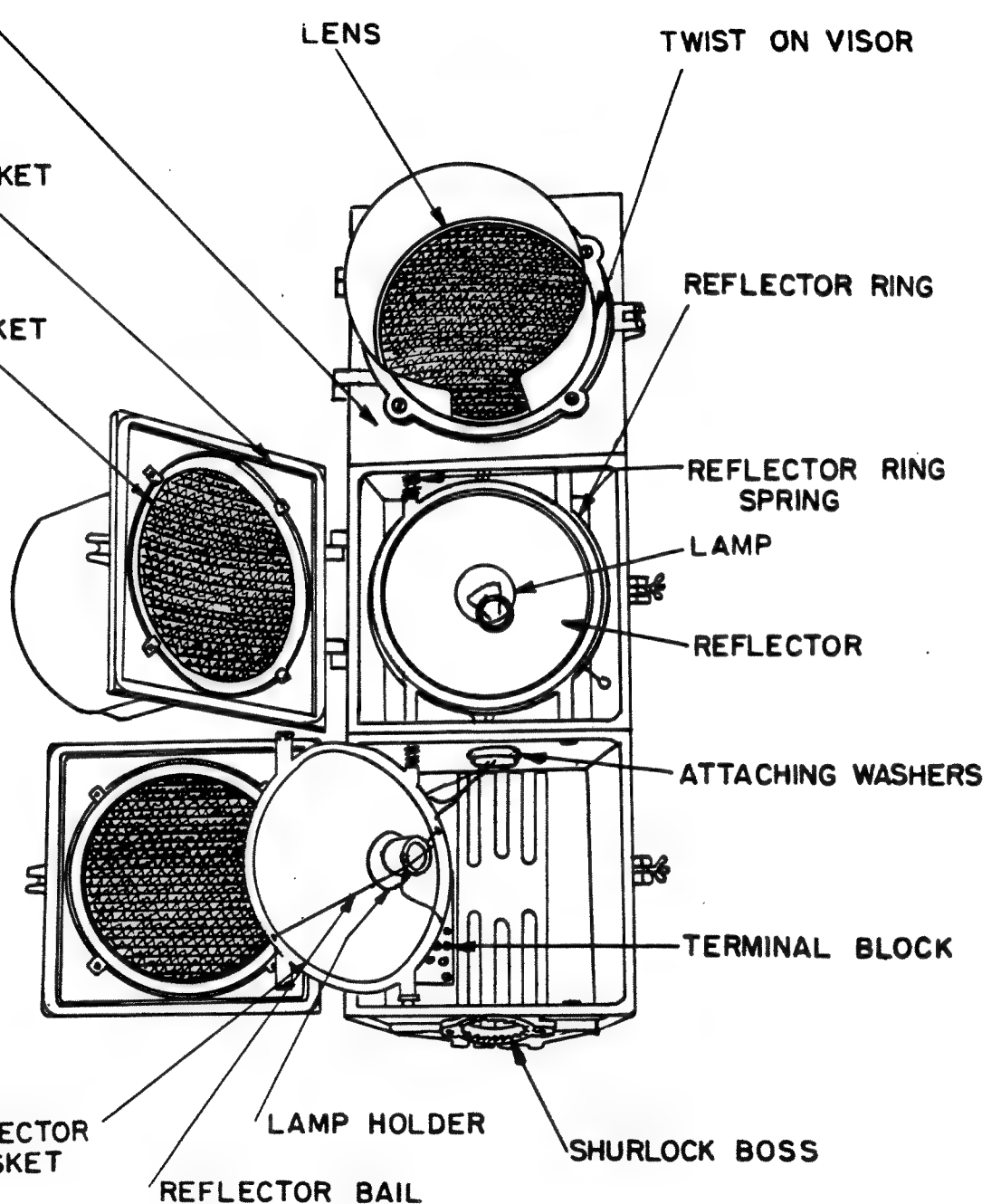
TERMINAL BLOCK

REFLECTOR
GASKET

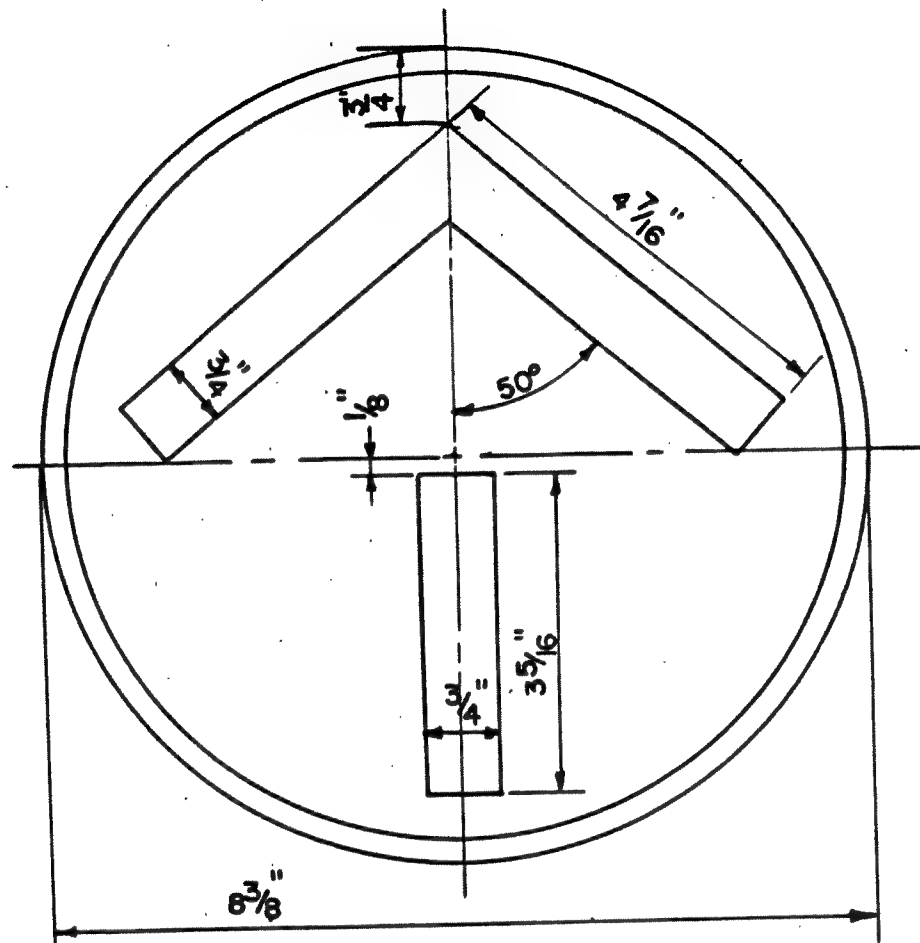
LAMP HOLDER

SHURLOCK BOSS

REFLECTOR BAIL

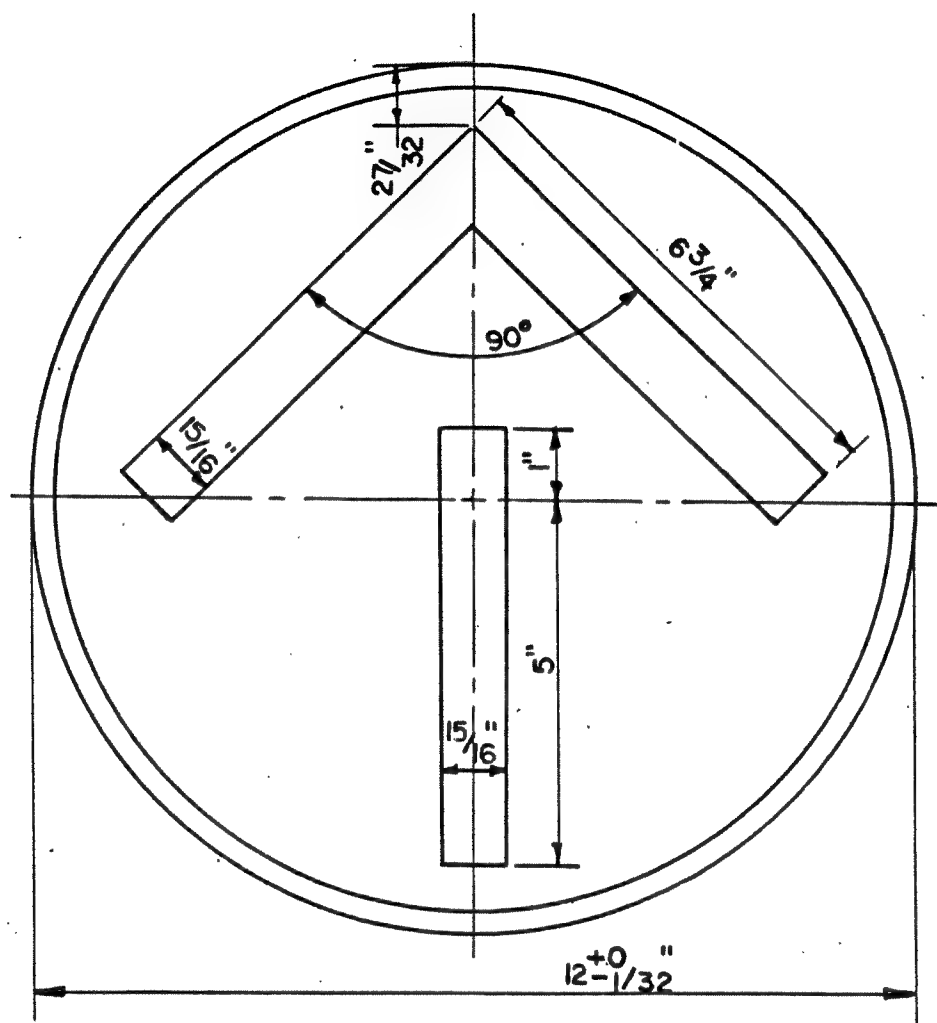


STANDARD ARROW FOR 8" SIGNAL LENS

Scale: $1/2" = 0' - 1"$

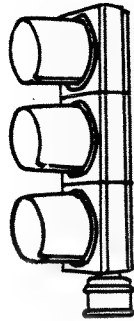
STANDARD ARROW FOR 12" SIGNAL LENS

48

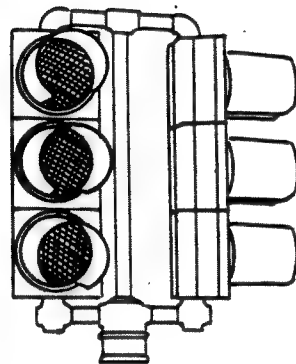
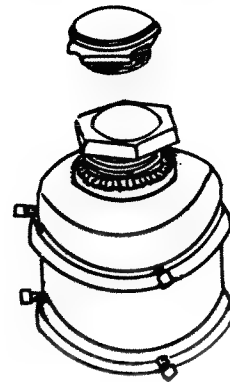


Scale: $3/8" = 0' - 1"$

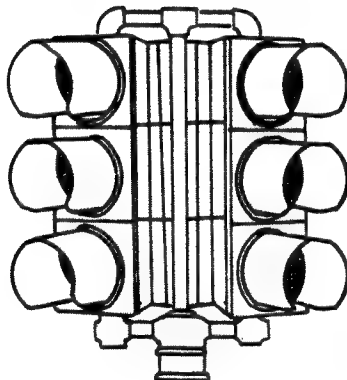
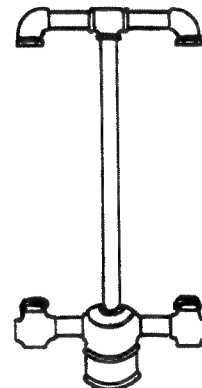
POST TOP MOUNTED 8" TRAFFIC SIGNALS



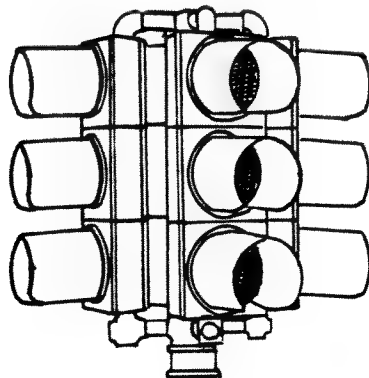
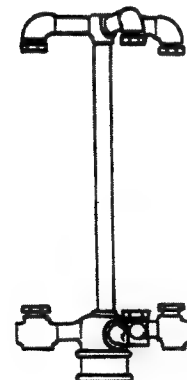
ONE WAY
THREE SECTION



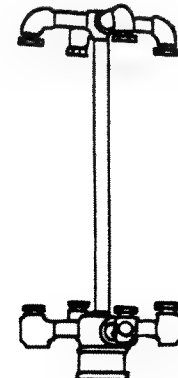
TWO WAY
THREE SECTION



THREE WAY
THREE SECTION



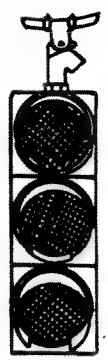
FOUR WAY
THREE SECTION



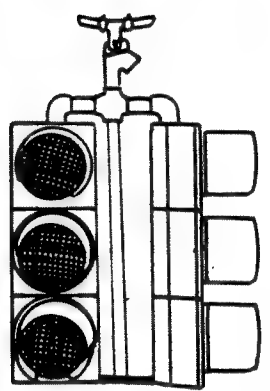
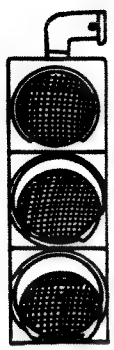
MOUNTING 8" TRAFFIC SIGNALS

SPAN WIRE MOUNTED

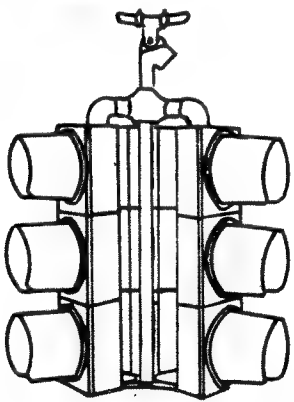
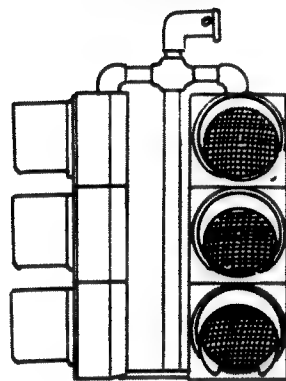
MAST ARM MOUNTED



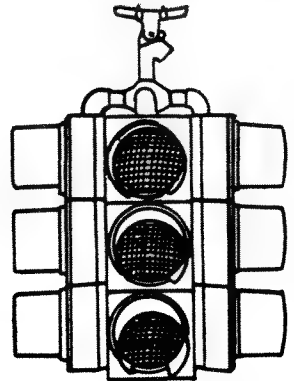
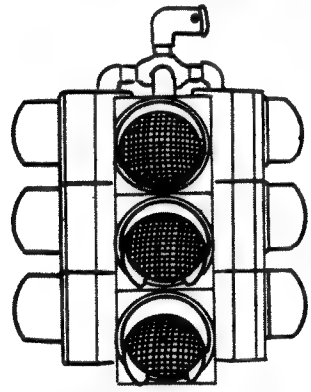
ONE WAY
THREE SECTION



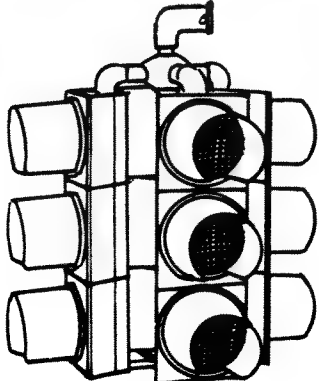
TWO WAY
THREE SECTION



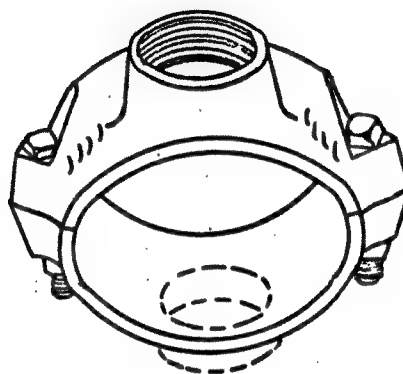
THREE WAY
THREE SECTION



FOUR WAY
THREE SECTION

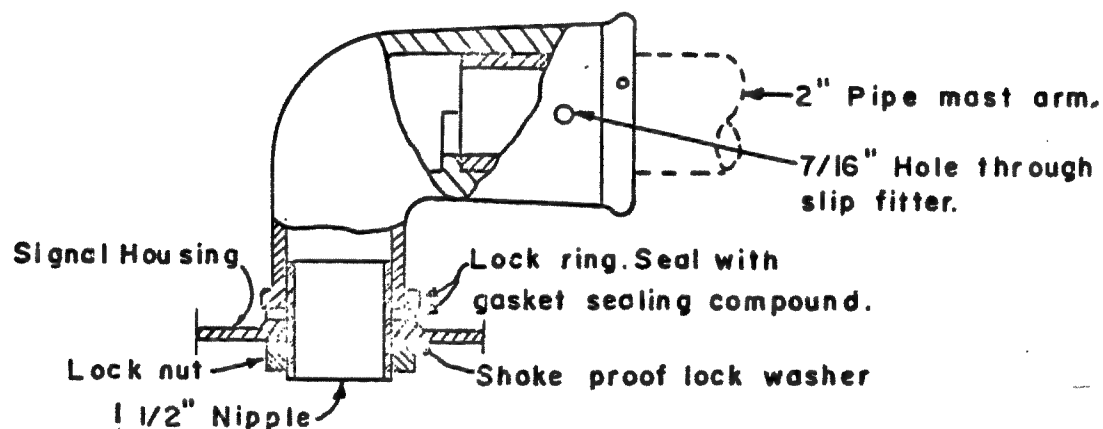
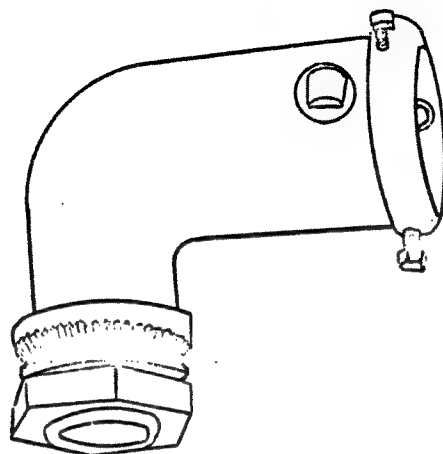


POLE CLAMPS FOR STEEL POLE MOUNTING (MALLEABLE IRON)



| POLE SIZE | | | |
|-------------------|----|-------------------|--|
| SINGLE 1 1/2" HUB | OR | DOUBLE 1 1/2" HUB | |
| NOM. I.D. | | ACTUAL O.D. | |
| 4" | | 4 1/2" | |
| 5" | | 5 9/16" | |
| 6" | | 6 5/8" | |
| 7" | | 7 5/8" | |
| 8" | | 8 5/8" | |

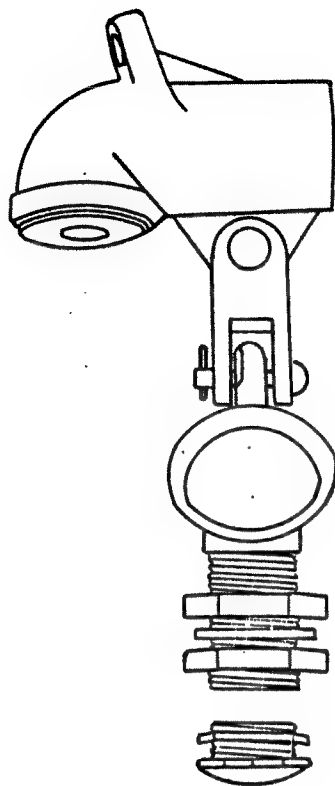
MAST ARM HANGER TYPE 2



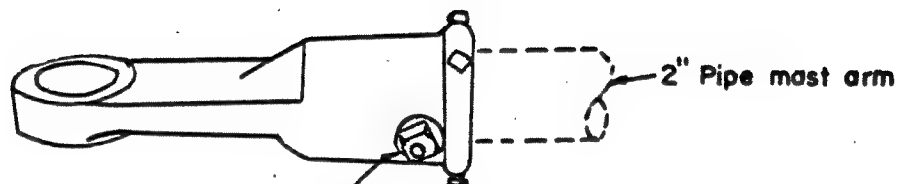
After signal has been plumbed and secured drill 7/16" hole through mast arm in line with hole through slip fitter.

Place 3/8" galvanized bolt with washer under bolt head through hole and secure with two nuts and a washer.

MAST ARM HANGER TYPE I



SIDE MOUNTED SLIP FITTER FOR MAST ARM MOUNTING

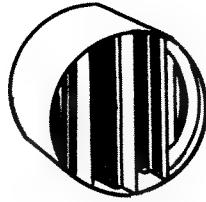


After signal has been plumbed and secured drill $7/16$ " hole through mast arm in line with hole through slip fitter.

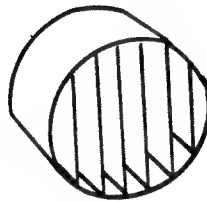
Place $3/8$ " galvanized bolt, with washer under head through hole and secure with two nuts and a washer.

(Use only when indicated on plans.)

LOUVERS FOR 8" SIGNALS

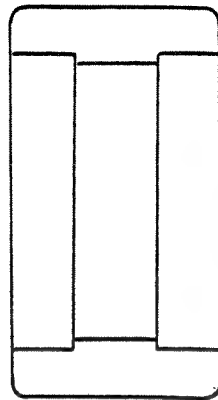


Directional, 3-Vane, with 3° cut-off right of center. Rotate louver 180° for 3° cut-off left of center.

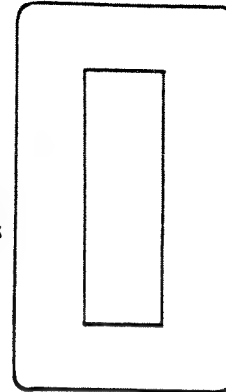


Directional, 6 Vane, with 3° cut-off right of center. Rotate louver 180° for 3° cut-off left of center.

MAST ARM MOUNTING BACKPLATES FOR 8" SIGNAL

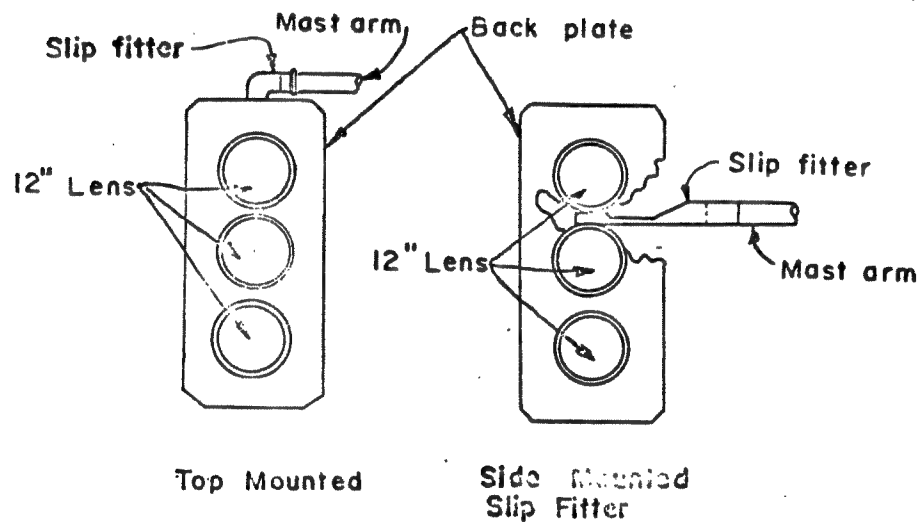


5" Border
for mast arm.



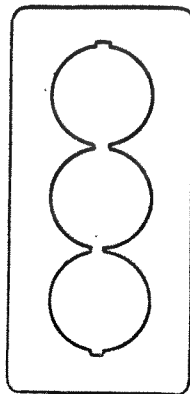
8" Border
for post mounting.

Drill signal head and
attach back plate us-
ing (6) 1/4"-20 plated
brass machine screws
with nut and lock
washer.

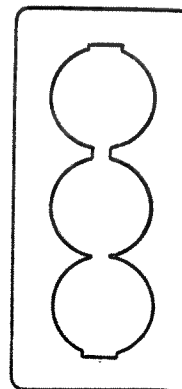


(Use only when
indicated on plans.)

BACKPLATES FOR 12" SIGNALS

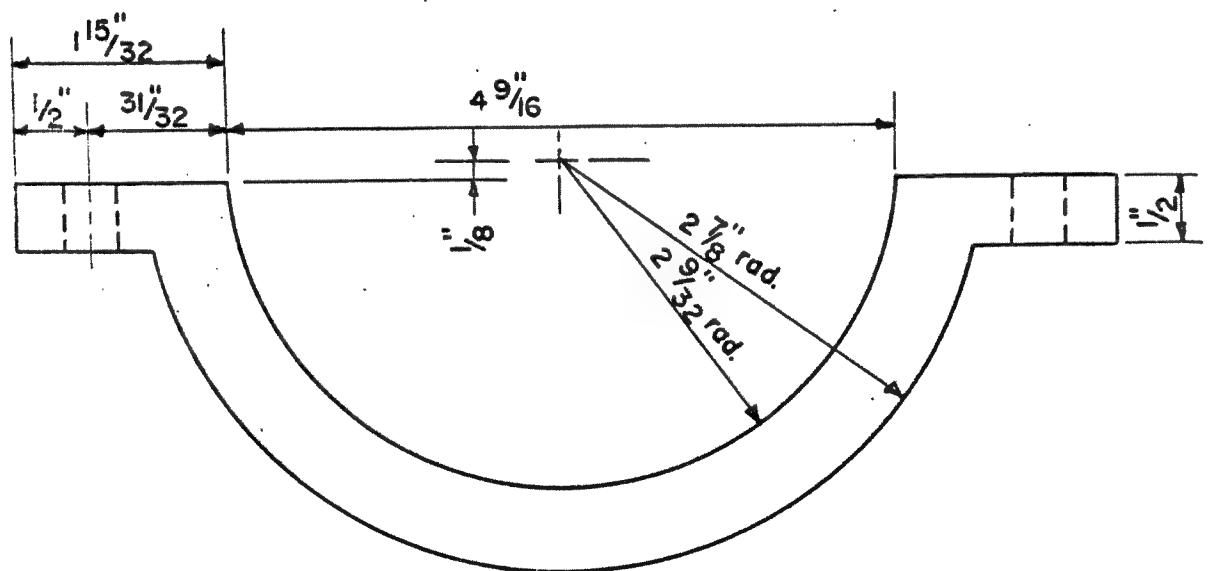
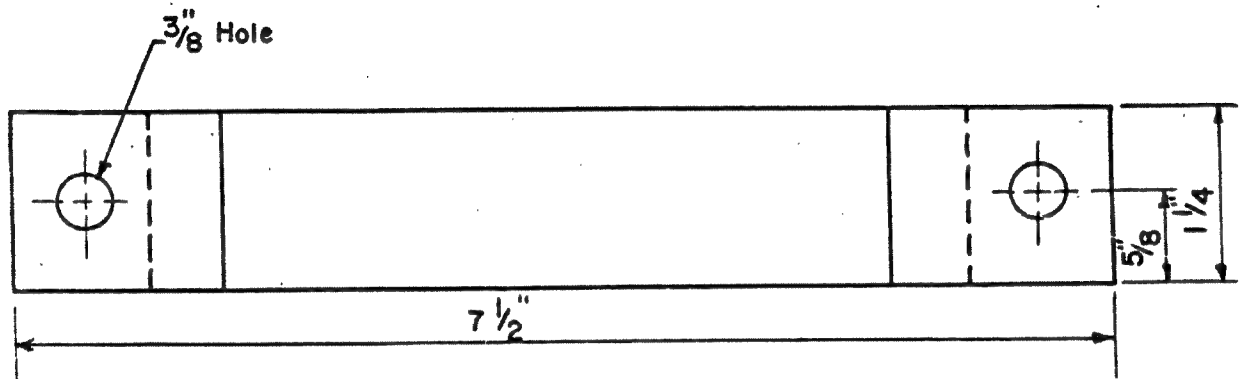


To fit 12" signal face.



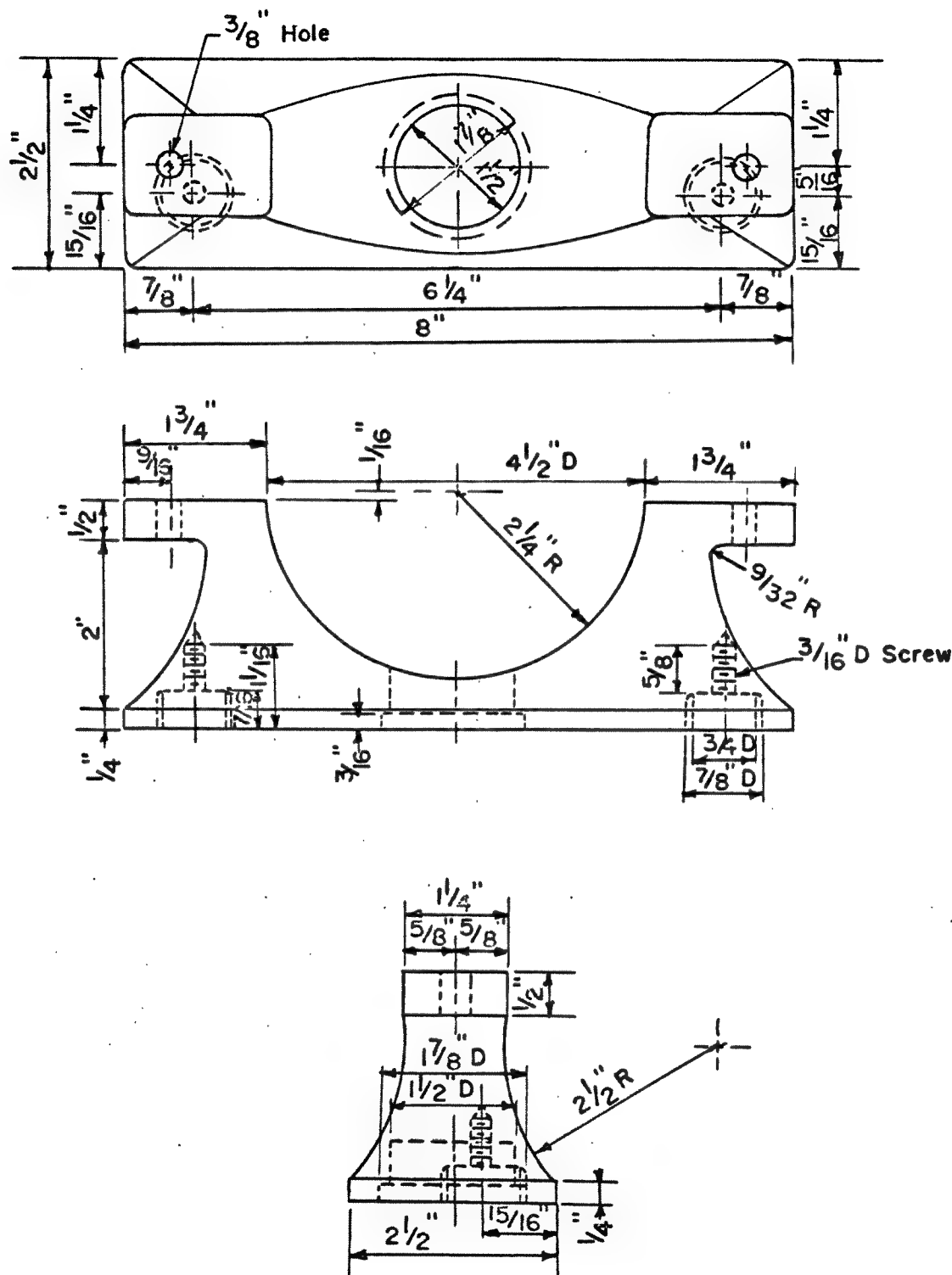
To fit 12" signal face equipped
with Elevator Plumbizer.

METER BOX CASTING FOR 4" PIPE POST

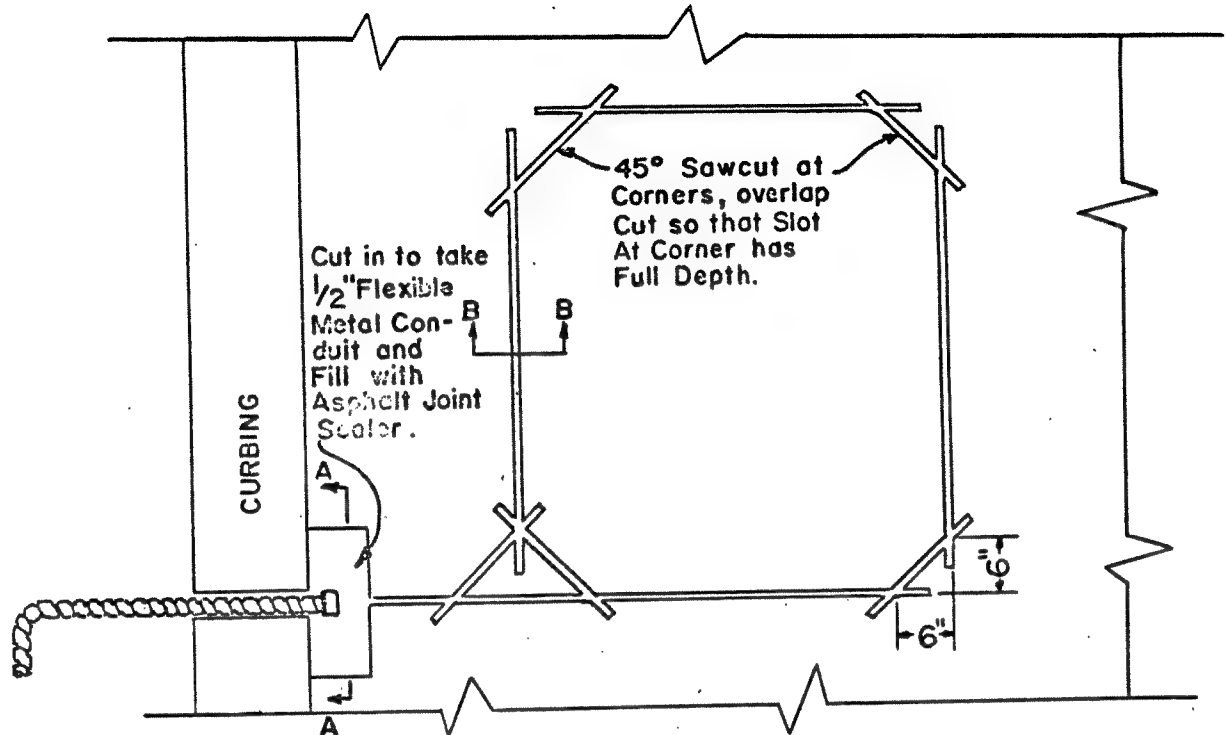


Scale: $3/4" = 1"$

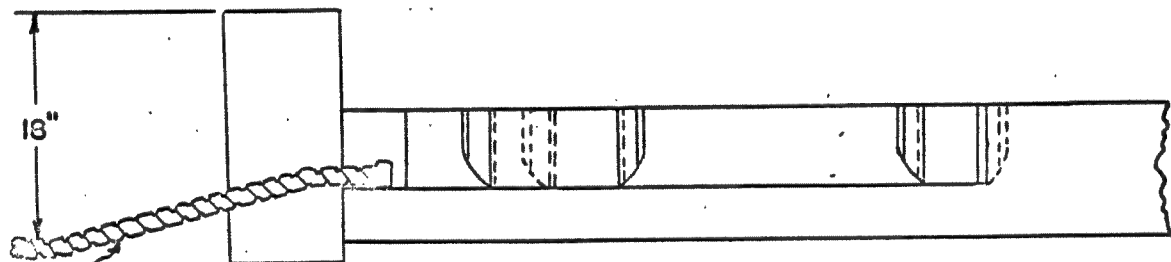
FLAT FRONT PIPE ENTRANCE
METER BOX CASTING FOR 4" PIPE



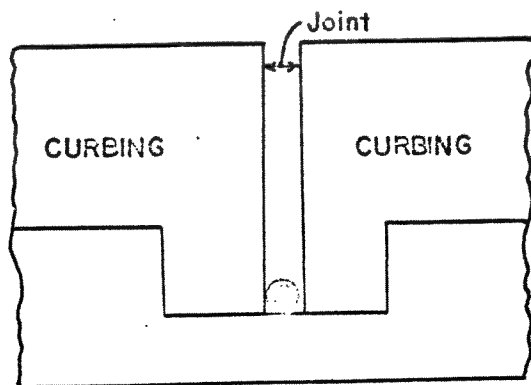
INSTALLATION OF WIRE LOOP DETECTOR



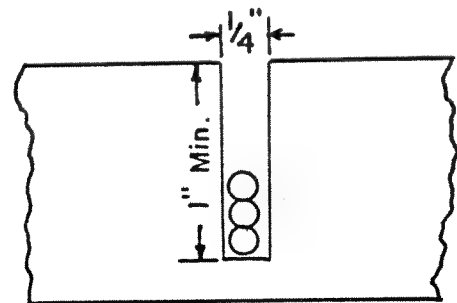
USE #12 AWG WIRE PER MANUFACTURERS' RECOMMENDATION.



Flexible Steel Conduit. Loop Conduit to Pull Box or Signal Foundation.



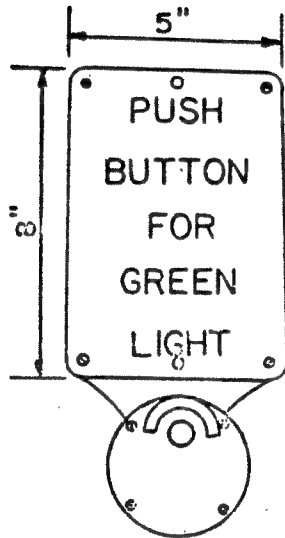
SECTION A-A



SECTION B-B

Not to Scale

PEDESTRIAN-ACTUATED SIGNAL SIGNS

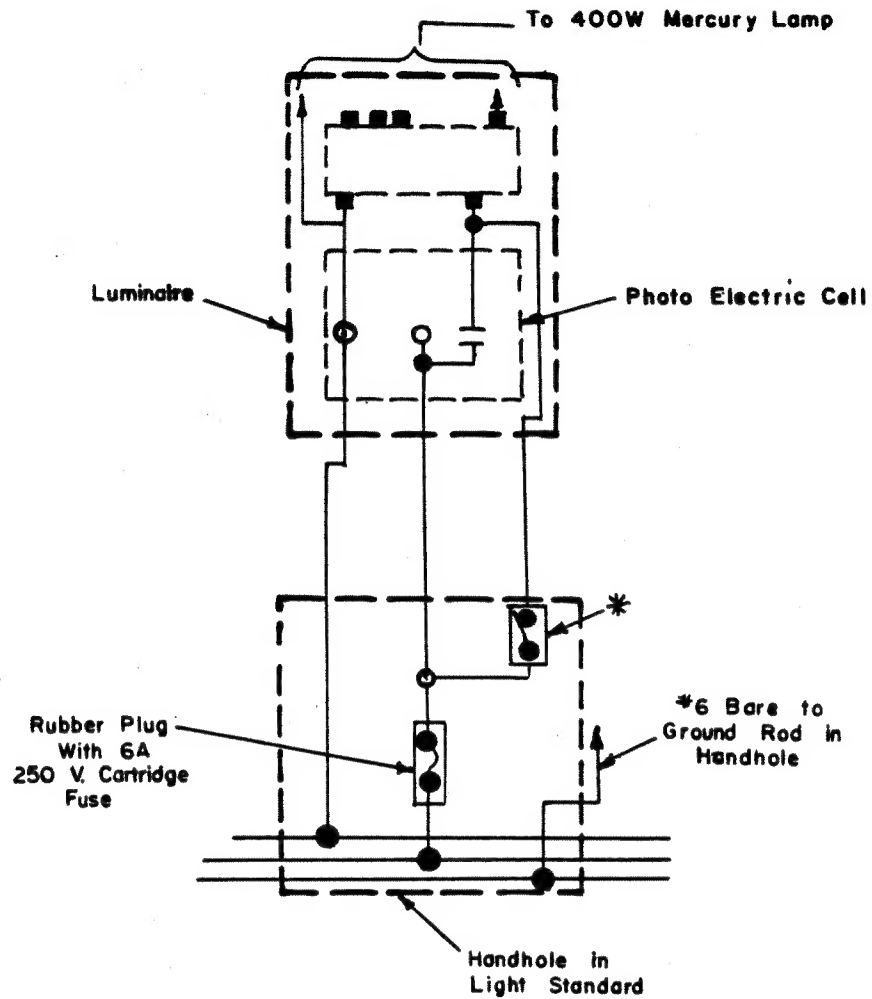


R9-6



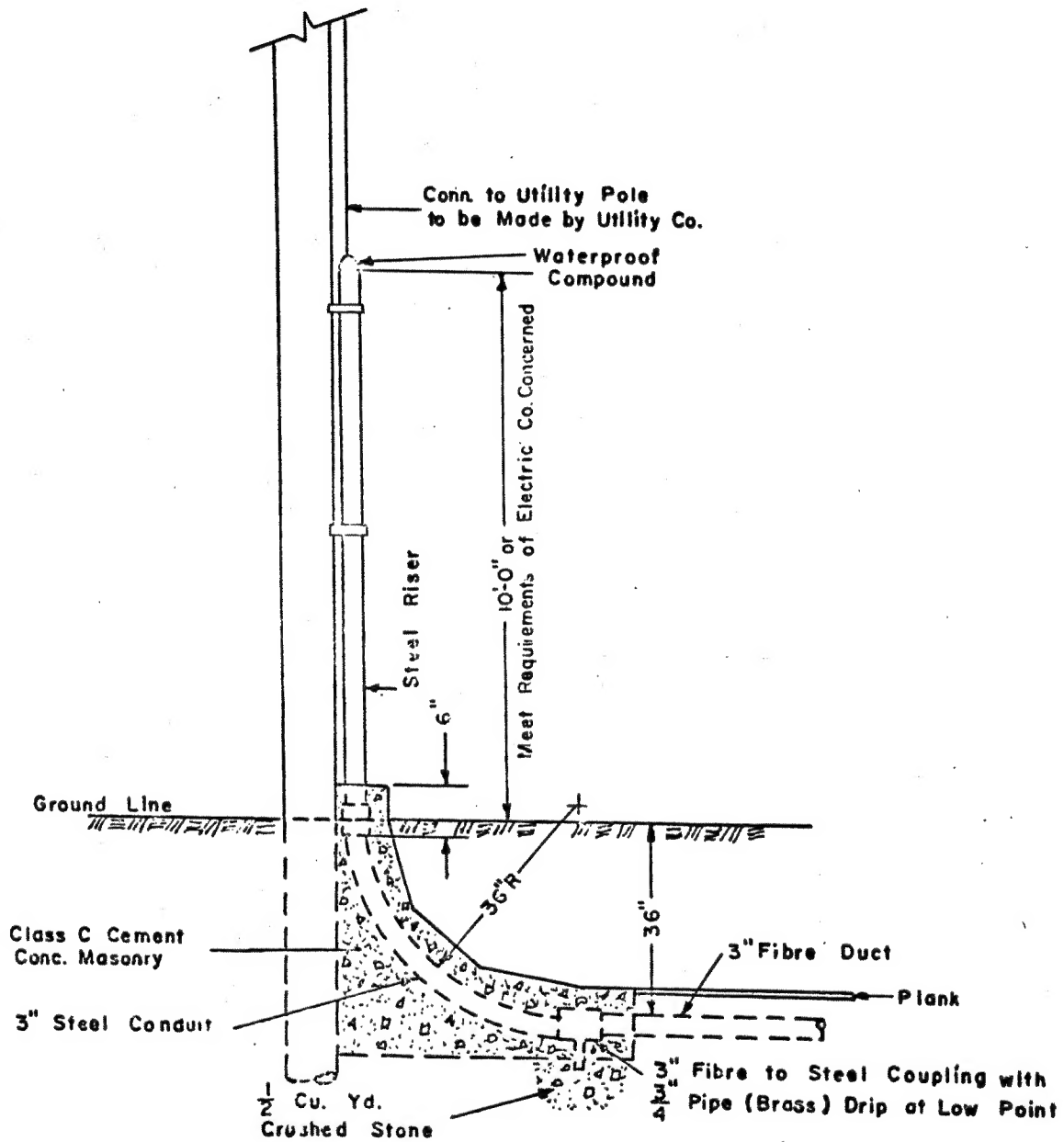
R9-7

Pushbutton should be at a height of 3-1/2 to 4 feet above the sidewalk, and the Pedestrian-Actuated Signal Sign, should be mounted immediately above it.



* - Weatherproof 1P 10 AMP. 240 V. Switch Mounted Inside of Handhole For Test Purposes.

WIRING DIAGRAM FOR
MERCURY LUMINAIRE



UTILITY SERVICE POLE RISER
HIGHWAY LIGHTING

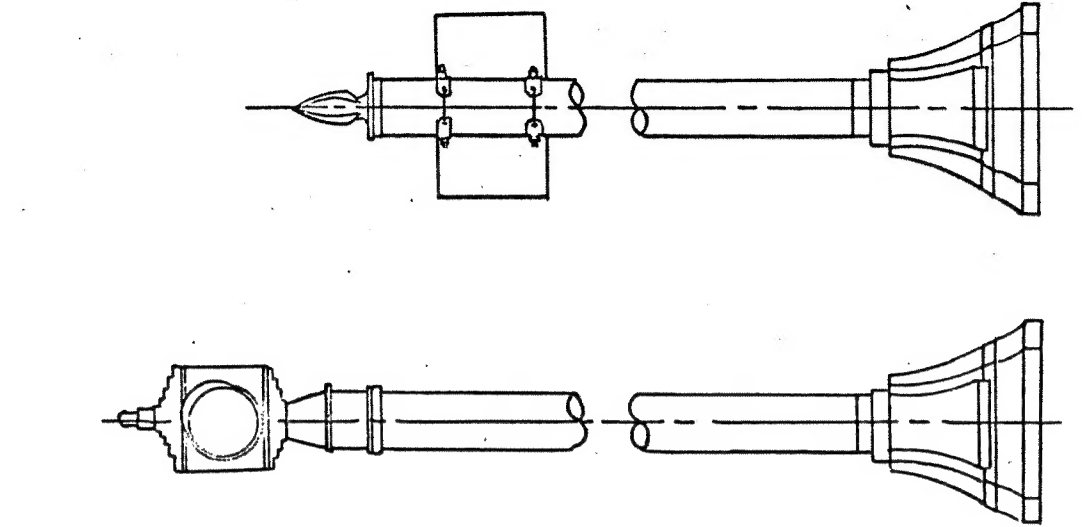
FLASHING BEACONS

63

METER & FLASHER PEDESTAL

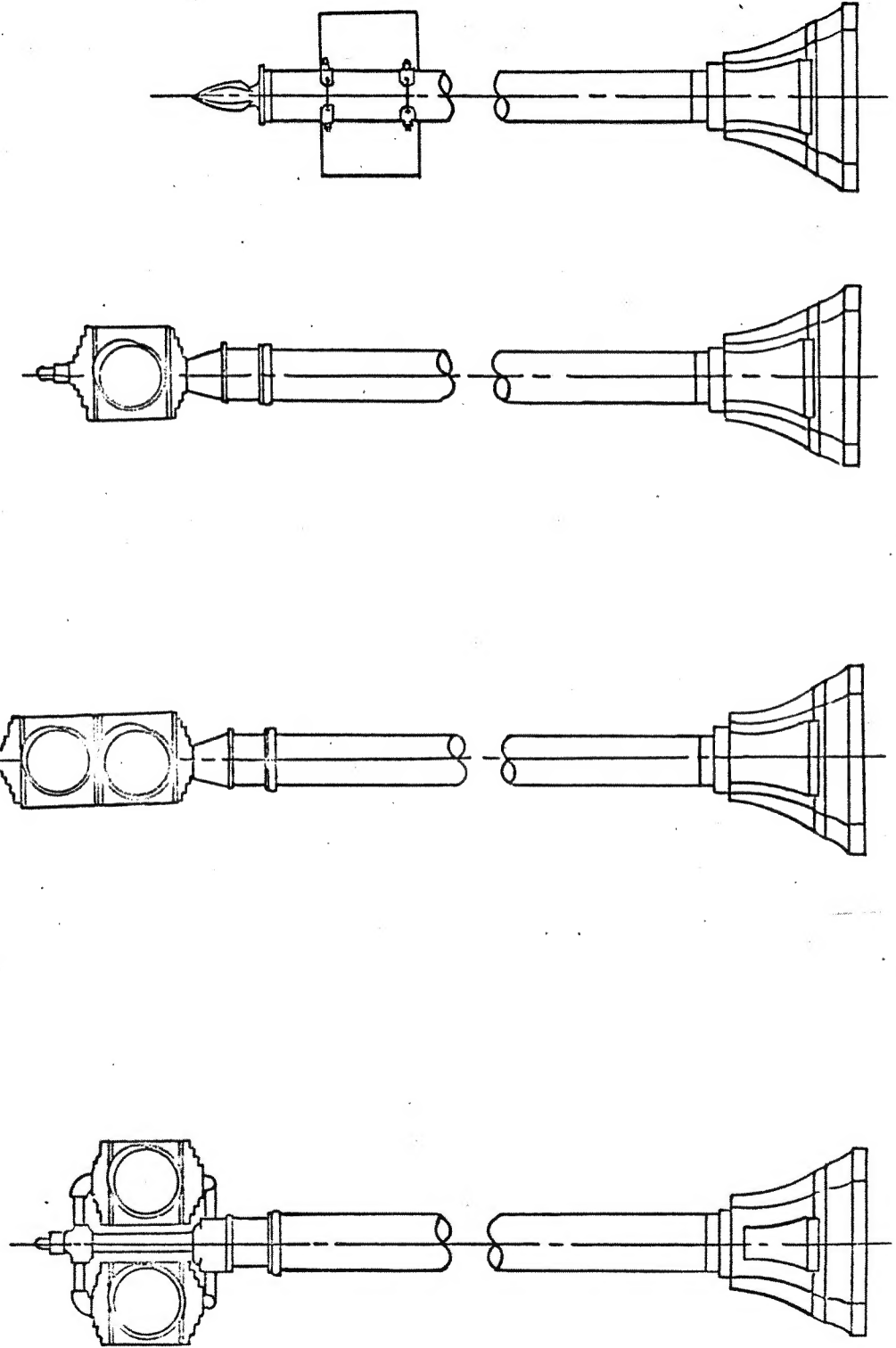
TYPE B

To be used at point where traffic must go to right of Beacon.



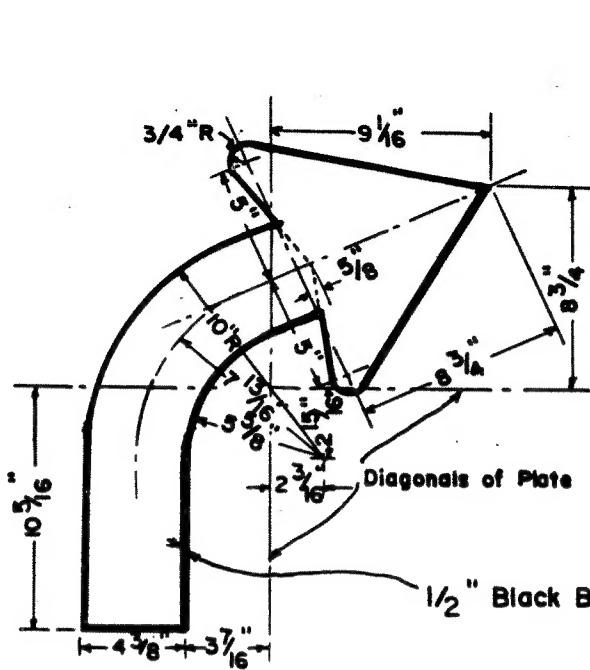
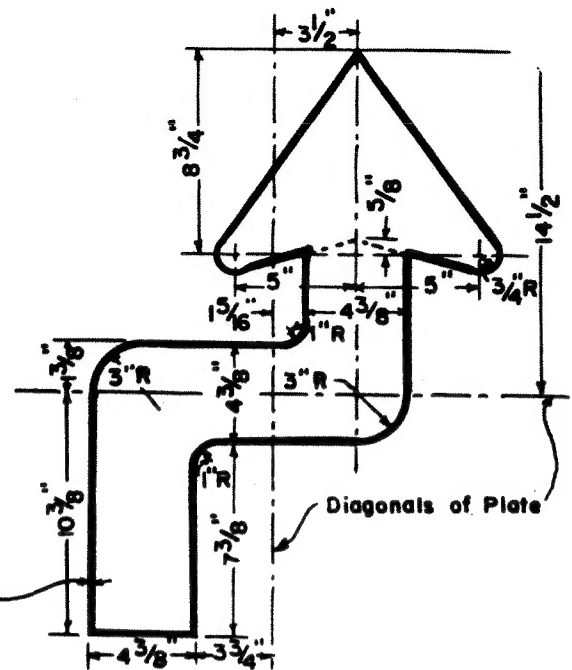
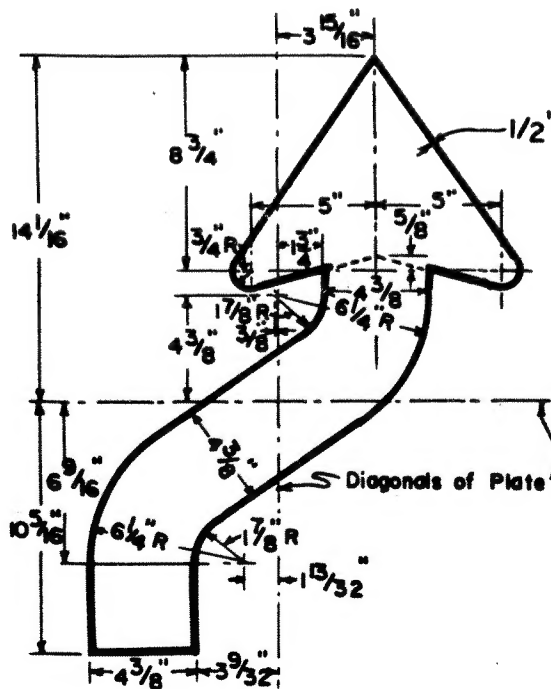
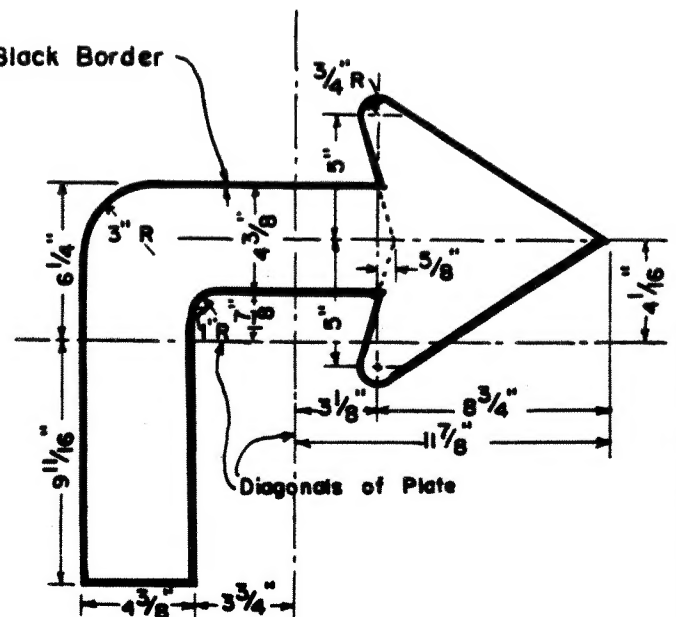
TYPE A

To be used at point where traffic can go to either left or right of the Beacon.



ALL POSTS SHALL BE STANDARD TYPE 8 FT. LONG INCLUDING BASE

ILLUMINATED TURN & CURVE SIGNS

WI-2
30" x 30"WI-3
30" x 30"WI-4
30" x 30"WI-1
30" x 30"

Scale: 1/8" = 1"